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Collective Review

THE RESULTS OF TREATMENT OF BREAST CANCER AT THE JOHNS HOPKINS HOSPITAL 1941-1945 WITH A DISCUSSION

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CANCER OF THE BREAST appears to have a universal distribution and is in fact an arrant "world citizen" whose cellular turmoil shows little predilection for race, climate, or geographical area. Statistics (19) indicate that in the United States one woman in 20 (representing 5 per cent of the female population) is destined to develop this disease and the risk of this probability increases steadily with the increase in age (Fig. 1).

It has been estimated by Shimkin (27) that during the next 5 year period approximately 2,000,000 new cases of cancer (excluding skin cancer) will occur in the United States alone. Of this appalling toll breast cancer will account for more than 250,000 new cases. Among females breast cancer represents an incidence of 21.7 per cent of all malignant conditions and it is the most frequent specific primary site of cancer in either sex.

Despite the tremendous strides of our healing art, breast cancer mortality has not yet reflected to any major degree the abounding benefits of an ever-improving surgical skill. It is indeed a most curious and disconcerting fact that the over-all standardized breast cancer death rate for females in the United States has remained virtually unchanged during the past quarter of a century.

Standardized Breast Cancer Death Rate in Percentages for Females in the United States from 1930 to 1955, inc. (38)

	1930	*1935*	*1940*	*1945*	*1950*	*1955*
Breast	21.6	21.6	23.1	22.5	22.0	21.5

In the light of our present day superiority in surgery, the utmost of power in radiotherapy, and our intensive cancer education program designed to promote prompt recognition, early diagnosis, and treatment without delay, this failure to cause a drastic reduction in the death rate of breast cancer presents a perplexing problem which for the present time remains inexplicable.

However, despite our unabashed disappointment, we must consider these facts as a challenge to our current methods of therapy and continue critically to review our results if improvement is to be expected.

The present study provides data concerning the 5 and 10 year end results of treatment for patients with breast cancer cared for at the Johns Hopkins Hospital between 1941 and 1945,

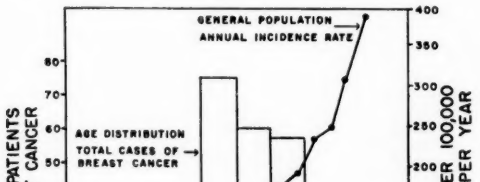
GENERAL POPULATION
ANNUAL INCIDENCE RATE
AGE DISTRIBUTION
TOTAL CASES OF
BREAST CANCER
NUMBER OF PATIENTS WITH BREAST CANCER
NEW CASES PER 100,000 POPULATION PER YEAR
AGE - YEARS
1-10 10-20 20-30 30-40 40-50 50-60 60-70 70-80 80-90 90-100

FIG. 1. United States statistics on cancer of the breast in women.

inclusive. During this period of time there were 259 women with primary breast cancer treated as in-patients at this hospital.

METHODS

It was the initial intent of this report to present, so far as possible, the end results of treatment in accord with the standardized methods recommended by: (1) the Joint Committee on Reporting Cancer End Results (37), and (2) the Committee on Clinical Stage Classification and Applied Statistics of the International Union Against Cancer (36).

Although no one method of analyzing breast cancer end results can clearly define all of the many problems of this disease, yet the uniform reporting of survival data by means of a simplified and standardized form will surely allow for a more accurate means of comparison. Thus,

Stage of Disease	Survival			
	5 year		10 year	
	No.	Per Cent	No.	Per Cent
Localized 71 patients	49	69	35	49
Regional 156 patients	46	30	25	16
Distant 30 patients	0	0	0	0
Unknown 2 patients	0	0	0	0

Total 259 patients.

FIG. 2. End results in 259 patients with primary breast cancer.

the effectiveness of alternative methods of treatment in a similar series of cases can be more critically analyzed, and the many subtle factors which influence the clinical course of the disease perhaps can be better evaluated by such a comparison. While staging is of great value in predicting the prognosis and in comparing end results, it is also of importance in forming categories of cases which may be compared to one another. However, as noted by McWhirter (23) "failure to recognize the importance of clear lines of demarcation between stages may not only defeat the purpose of staging, but may even mislead."

Johnson (17) has indicated that "the analysis of clinical data is primarily a problem in interpreting statistical associations. Case selection is the principal pitfall." It is undoubtedly true that most differences in reported end results are due to the presence of an unrecognized or unavoidable bias in case selection or in classifying case categories. It is hoped that this "built-in-bias" can be more effectively eliminated by using uniform methods of classification and reporting. However, in the presentation of this retrospective study it was found to be impossible to adhere to these rigid and standardized methods of reporting.

MATERIAL

The present study consists of a retrospective follow-up survey of all patients with breast cancer who were admitted as "in-patients" to the Johns Hopkins Hospital between 1941 and 1945, inclusive. A total of 313 patients were admitted to the hospital during this period including male and female, private and ward, and negro and white. An indeterminate number of "out-patients" were seen in a large and active Tumor Clinic but data on this group of Dispensary "out-patients" are not available and, therefore, are not included in this study. This in itself may represent a purely unintentional source of case selection.

In this total of 313 patients there were two females with malignant melanomas of the breast, one female with sarcoma of the breast, 47 females with previously treated and recurrent or metastatic breast cancer, and 4 males with primary breast cancer. The remaining 259 patients were women with untreated primary breast cancer. This latter group of patients comprised the present series.

In a retrospective study the difficulties of tracing patients who had been operated upon some years previously are obvious but not insurmountable. With diligence and perseverance a successful follow-up was obtained in 249 of 259 female patients, or 96 per cent, despite the fact that the period of study was during the turbulent years of World War II. For the purpose of this report all patients lost to follow-up were considered to have died of breast cancer. The diagnosis was microscopically verified in 242 of 259 female patients with primary untreated breast cancer. There were 4 patients (1.5 per cent) in this series who had simultaneous bilateral cancer of the breast.

RESULTS

Total End Results

The over-all 5 year survival rate including every female patient with primary breast cancer treated at the Johns Hopkins Hospital, regardless of the type of surgical treatment or the stage of advancement of the disease was 36.7 per cent. Using a more ambitious and perhaps a more realistic yardstick, the over-all 10 year survival rate was only 23.2 per cent. However, among the 71 patients (28 per cent) in this series (Fig. 2) having cancer localized to the breast alone, the 5 year survival rate was 69 per cent and the 10 year survival rate was 49 per cent. Among 156 patients (60 per cent) in this series having disease limited to the regional nodes, the 5 year survival rate was 30 per cent and the 10 year survival rate was 16 per cent. There were no 5 or 10 year survivors among the 30 patients with metastatic disease. The stage of the disease in 2 patients was unknown.

Thus, I think that it is readily apparent that the one most important factor which we can readily ascertain in determining the probable end result in cancer of the breast is the extent of advancement of the disease at the time of treatment. The most accurate form of staging combines both the histological evidence with the clinical examination of the patient. This is true particularly in the presence of metastases. Although the term "cancer" is infinitely graded and controlled by many factors, the precise characteristics which determine the final outcome in a patient with breast cancer and her response to treatment remain unknown at this time.

Stage of Disease	5 Year Survival	
	No.	Per Cent
Localized 59 patients	42	71
Regional 126 patients	43	34
Distant 0 patients	0	0
Total 185 patients	85	46

FIG. 3. End results of radical mastectomy in patients with primary breast cancer.

End Results of Radical Mastectomy

In the present series (Fig. 3) there were 185 of a total of 259 patients who were treated by means of radical mastectomy with or without ancillary radiotherapy. This represents an operability rate of 71 per cent for this type of operation. The 5 year end results for radical mastectomy revealed an over-all survival rate of 46 per cent. Of 59 patients (32 per cent) in the radical mastectomy group who had their cancer localized to the breast alone, the 5 year survival rate was 71 per cent. Of 126 patients (68 per cent) having their disease limited to the regional nodes, the 5 year survival rate was 34 per cent. There were no 5 year survivors among patients with metastatic disease.

Radical Mastectomy and Radiotherapy

During the period of time spanned by this study there was no standard practice at the Johns Hopkins Hospital regarding radiotherapy. However, today it is the recommended practice at the Breast Clinic to employ postoperative radiotherapy as an adjunct to surgery in all

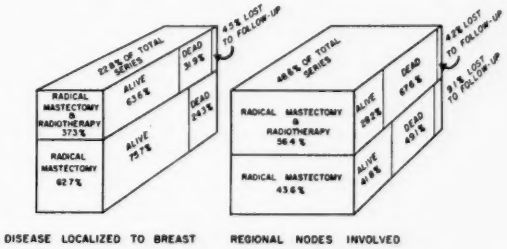

FIG. 4. Radical mastectomy; 5 year survival.

Stage of Disease	5 Year Survival	
	No.	Per Cent
Localized 12 patients	7	58
Regional 23 patients	3	13
Distant 8 patients	0	0
Total 43 patients	10	23

FIG. 5. End results of simple mastectomy in patients with primary breast cancer.

patients with metastases to the axilla verified by pathologic examination. Postoperative radiotherapy is also recommended for patients having subareolar or medial hemisphere lesions regardless of the presence or absence of axillary metastases.

Among the present group of patients (Fig. 4) having their cancer localized to the breast alone there were 37.3 per cent who received postoperative radiotherapy in addition to radical mastectomy. The 5 year survival rate of this group was 63.6 per cent whereas the 5 year survival rate for the patients treated by radical mastectomy alone was 75.7 per cent. Thus, it would appear from these results that patients treated by radical mastectomy alone have a better chance of survival. However, it is well to remember that there may be serious limitations with respect to the comparability of these data.

Of those patients having metastases to the regional nodes there were 56.4 per cent who received postoperative radiotherapy in addition to radical mastectomy. The 5 year survival rate of this group was 28.2 per cent, whereas the 5 year survival rate for the patients treated by radical mastectomy alone was 41.8 per cent.

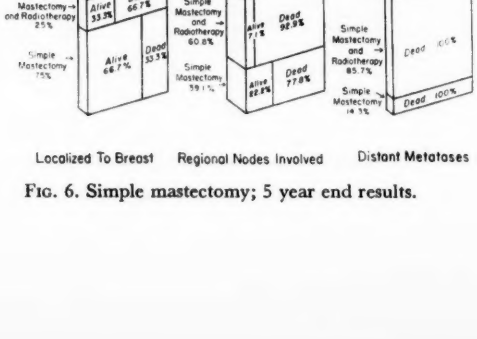

FIG. 6. Simple mastectomy; 5 year end results.

Again it would appear that radiotherapy when added to radical mastectomy tended to lessen rather than lengthen life expectancy. While the possibility of this cannot be denied, at the time of this study it was the customary practice deliberately to select patients with large or advanced lesions (and there were many such patients in this series) for ancillary radiotherapy. Thus, the clinical sample was selected and if the science of statistics is "arithmetic guided by logic," then the "weighted" sample of this deliberate choice must be recognized and given careful consideration.

End Results of Simple Mastectomy

There were 43 patients (16.6 per cent) of a total of 259 who were treated by simple mastectomy (Fig. 5), with or without ancillary radiotherapy. The 5 year end results for simple mastectomy revealed an over-all survival rate of 23 per cent. It is of importance to note, however, that at the Johns Hopkins Hospital simple mastectomy is usually employed as a palliative procedure in patients with advanced disease or in the aged or poor risk patient. Therefore, the end results in this specially selected group would be expected to be poor.

In this limited group of patients, those having the disease localized to the breast alone, the 5 year survival rate was 58 per cent, whereas in those having metastases to the regional nodes the 5 year survival rate was only 13 per cent.

Simple Mastectomy and Radiotherapy

In the present group of simple mastectomy patients, with cancer localized to the breast alone, there were 25 per cent who received postoperative radiotherapy in addition to simple mastectomy (Fig. 6). The 5 year survival rate of this small group was 33.3 per cent as compared with a 5 year survival rate of 66.7 per cent for patients treated by simple mastectomy alone. Of the patients having metastases to the regional nodes, there were 60.8 per cent who received postoperative radiotherapy in addition to simple mastectomy. The 5 year survival rate of this group was 7.1 per cent, whereas the 5 year survival rate for the patients treated by simple mastectomy alone was 22.2 per cent.

End Results of Other Treatment

A small group of patients in this series were treated by means of biopsy or local excision, dis-

section of the axillary nodes, or no operation except biopsy in some cases. A small number of these patients were considered inoperable when first seen, while others refused operation for various reasons. Regardless of the type of treatment, the end results in all of them were uniformly poor, no patient surviving the 5 year period.

The criteria of inoperability at the Johns Hopkins Hospital are widely varied in accord with the judgment of the individual surgeon, but they are generally considered to be very lenient. Many patients undergoing radical mastectomy at the time of this report would probably be considered inoperable by today's standards. Although it is my personal belief that *more lives are probably shortened by poor selection than by poor surgery*, yet there still exists a great diversity of opinion among surgeons regarding proper standards of inoperability. In advanced lesions the local and systemic host-tumor resistance factors should not be embarrassed by imprudent radical surgery.

End Results in Relation to Side and Site of the Primary Tumor, the Type of Treatment, and the Stage of the Disease

In the present series (Fig. 7) the incidence of cancer in the left breast was 53.9 per cent, in the right breast it was 44.6 per cent, and in both breasts simultaneously it was 1.5 per cent.

The location of the primary tumor within the breast has been considered by some to show special promise in predicting the prognosis. The upper and outer quadrants of both breasts were involved in 44.3 per cent of the patients. The frequency of breast cancer in this location is well recognized and many reasons have been proposed for the predilection of this position. The upper and inner quadrants of both breasts were involved in 9.7 per cent of the patients. However, despite the great difference in site incidence, there was very little difference in the over-all 5 year survival rates between the upper and inner and the upper and outer quadrant lesions.

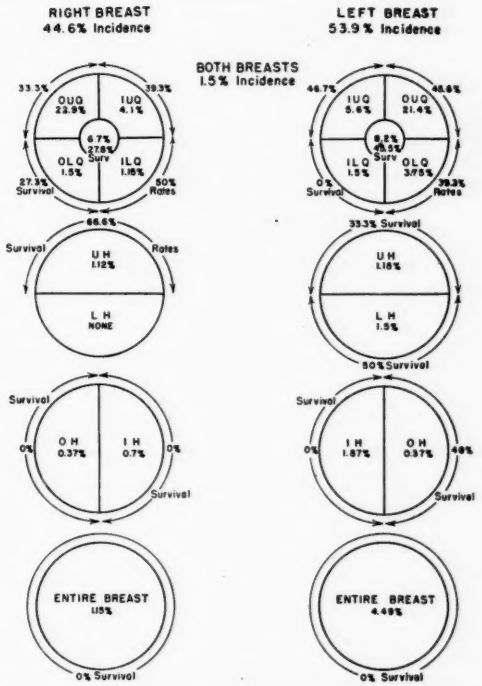

FIG. 7. Summary of site incidence; 5 year end results.

In the summary of side and site incidence (including subareolar lesions) correlated with the 5 year end results (Fig. 7) there was no convincing evidence that the survival rate varied significantly with the position of the primary tumor. However, in the correlation between the location of the tumor by hemisphere and the 5 year survival the accompanying results were obtained according to the stage of the disease:

In patients having breast cancer with axillary metastases the 5 year end results in this series appeared to be more favorable when the tumor was located in the lateral or outer hemisphere than when it was located in the medial or inner hemisphere. This difference did not appear to be present for patients with less advanced disease.

Disease Localized to the Breast

	Alive	*Per cent*	*Dead*	*Per cent*	*L.F.U.**	*Per cent*
Lateral hemisphere	25	66	13	34	0	0
Medial hemisphere	9	64	5	36	0	0

Metastases to Regional Nodes

	Alive	*Per cent*	*Dead*	*Per cent*	*L.F.U.**	*Per cent*
Lateral hemisphere	28	33	52	62	4	5
Medial hemisphere	5	22	16	69	2	9

*L.F.U. means lost to follow-up.

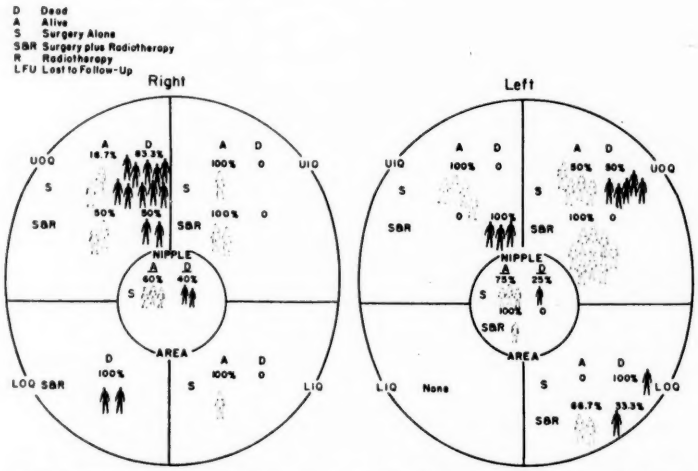

FIG. 8. Five year survival in relation to type of treatment and site of primary tumor; disease localized to breast alone.

The work of Handley (16) affords a logical interpretation of these findings. Perhaps by the time a medial hemisphere tumor has spread to the homolateral axilla it is likely that metastases also have occurred in the internal mammary nodes or beyond. The slight discrepancy between these data and those depicted in Figure 8 and Figure 9 can be accounted for by the few surgical records in which the location of the lesion was noted by hemisphere rather than by quadrant.

When the disease was localized to the breast alone (Fig. 8) surgery plus radiotherapy appeared to be a slightly more effective treatment than surgery alone. However, when metastases to the regional nodes were present (Fig. 9), the reverse was true, surgery alone appeared to be a more effective form of treatment than surgery plus radiotherapy. When classified in accord with this site incidence, the categories of the inner and lower quadrants of each breast contained too small a number of patients in each group for the results to be regarded as being significant.

Concerning the type of treatment in stage 1 breast cancer, there appeared to be some increase in the survival period of patients with upper and outer quadrant lesions when surgery plus radiotherapy was employed. In stage 2 breast cancer, however, the reverse was found to be true.

End Results in Relation to Size of the Primary Tumor, Stage of the Disease, and the Type of Treatment

It is considered almost axiomatic in predicting prognosis for a group of patients with breast cancer that the smaller the primary tumor, the better the end result.

In the present study when the disease was localized to the breast alone the 5 year end result for small primary tumors (2.5 cm. or less) revealed a survival rate of 74 per cent. The type of treatment appeared to have very little bearing on this end result (Fig. 10). For medium-sized tumors (2.5 to 5.0 cm.) in localized disease the 5 year end result was a survival rate of 70 per cent. The influence of the type of treatment was difficult to evaluate in this small group of cases. For large sized tumors (5.0 cm. or more) in disease localized to the breast alone the 5 year end result was only 53 per cent. Surgery alone appeared to be superior to surgery plus radiotherapy in the treatment of this group of cases.

When the regional nodes were involved with metastases, the 5 year end results for small primary tumors revealed a survival rate of 32 per cent. The end results of surgery alone appeared to be slightly better than surgery plus radiotherapy as the treatment of choice (Fig. 11). For medium-sized tumors with axillary metastases the 5 year end result was a survival rate of 40 per cent. Surgery alone again appeared to be the superior treatment. For large-sized tumors

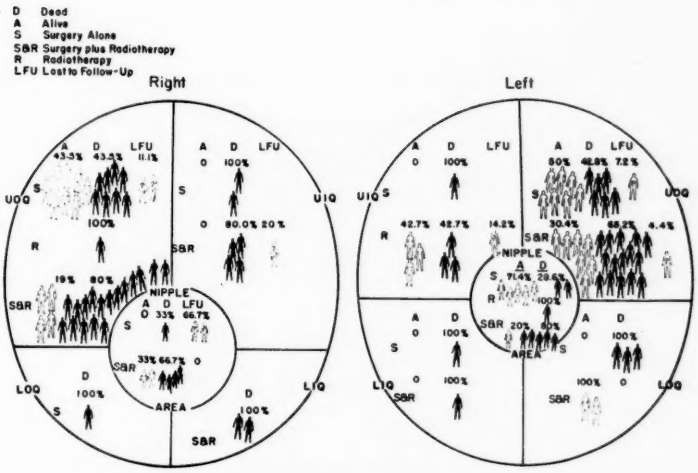

FIG. 9. Five year survival in relation to type of treatment and site of primary tumor; metastases to regional nodes.

with axillary metastases the 5 year end result was a survival rate of 20.5 per cent. The treatment providing the best end result was surgery alone.

Thus, a more favorable prognosis was found to be correlated with a small or medium-sized primary tumor. This appeared to be true both in patients with localized disease as well as in those with regional metastases.

End Results in Relation to Stage of the Disease, the Type of Treatment and Duration of the Disease

Whereas the duration of disease may be a real expression of the relationship between malignant tumor (growth) and host resistance, yet it also merely may represent the acute powers of observation or perhaps the lapse of memory of the patient. The reliability of such information which is so dependent upon the personal equation must be interpreted with considerable caution.

When the disease was localized to the breast alone the following 5 year survival rates prevailed for patients with tumors that had been present for varying periods of time:

Period of time	*Per cent*
Less than 1 month	67
1 to 3 months	64
3 to 6 months	86
6 to 12 months	57
12 to 24 months	75
More than 24 months	67

It would appear from this analysis that, except for tumors present for 6 to 12 months, the duration of disease failed to have any significant bearing on end results in patients with stage 1 breast cancer. When the type of treatment was considered (Fig. 12), however, the evidence suggests that surgery and radiotherapy were associated with a better prognosis than was surgery alone.

When metastases to the regional nodes were present, the following 5 year survival rates prevailed for patients with tumors that had been present for varying periods of time:

Period of time	*Per cent*
Less than 1 month	33
1 to 3 months	33
3 to 6 months	27
6 to 12 months	13
12 to 24 months	36
More than 24 months	30

In this group of cases, as in the previous group, the critical period in the duration of disease appeared to be between 6 and 12 months. Perhaps the more malignant and rapidly growing tumors are recognized early, receive prompt attention, and earlier treatment, whereas the less malignant and slow-growing tumors of much longer duration receive later treatment and by virtue of their natural indolence enable the patient to survive the 5 year period. Thus, those tumors present for 6 to 12 months may represent either

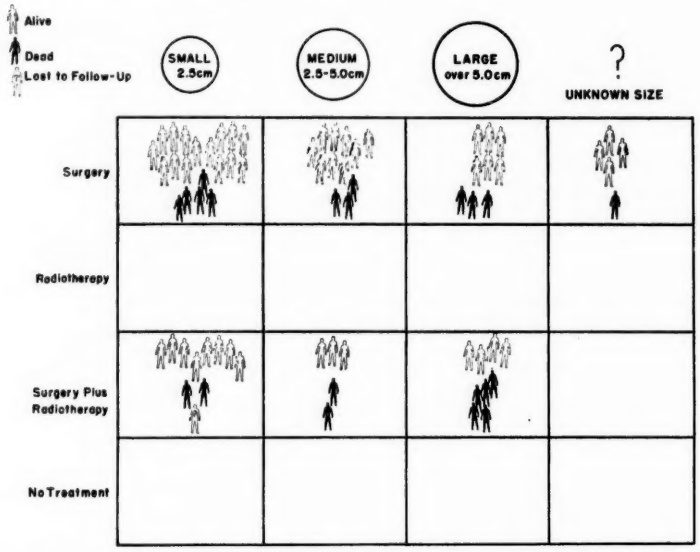

FIG. 10. Five year survival in relation to size of primary tumor; disease localized to breast alone.

(1) delay in diagnosis and treatment of rapidly growing tumors, or (2) tumors with a moderate degree of mitotic activity. In either case the prognosis is poor.

In this group of patients with metastases to the regional nodes (Fig. 13) surgery alone seemed to be associated with a better 5 year survival than surgery and radiotherapy.

Age in Relation to the End Results

Breast cancer occurring in young women has been generally regarded as an especially ominous disease. The disastrous effect of pregnancy and lactation in this age group indicates that destiny grants no special favors to the young or to the mothers of the young.

In the present series the over-all 5 year end results were as follows:

Age	*5 Year Survival Rate Per cent*
40 years and under	40.5
41 years and over	33.5

For those patients with breast cancer localized to the breast alone the 5 year end results were as follows:

Age	*5 Year Survival Rate Per cent*
40 years and under	82
41 years and over	78.5

For those patients with axillary metastases the 5 year end results were as follows:

Age	*5 Year Survival Rate Per cent*
40 years and under	25.8
41 years and over	20.0

These data do not bear out the suggestion that there is any greater degree of malignancy in breast cancer among younger women, 40 years or less. This appears to be true regardless of the stage of the disease. The 5 year survival rate in this comparatively small group (15 per cent of the series) of young women (there were only 40 women who were 40 years of age or under) was actually better than the survival rate among older women. The histologic appearances of carcinoma in the young and in the old have been carefully compared by Lees and Park (18) and no significant differences could be detected between the two groups.

The precise relationship between age and survival is quite a complex problem. As patients become older their general health becomes poorer and therefore they are more likely to die of intercurrent disease. The older the patient the shorter the life expectancy. Since all deaths in this series, regardless of cause, were considered as death due to breast cancer, a minor source of

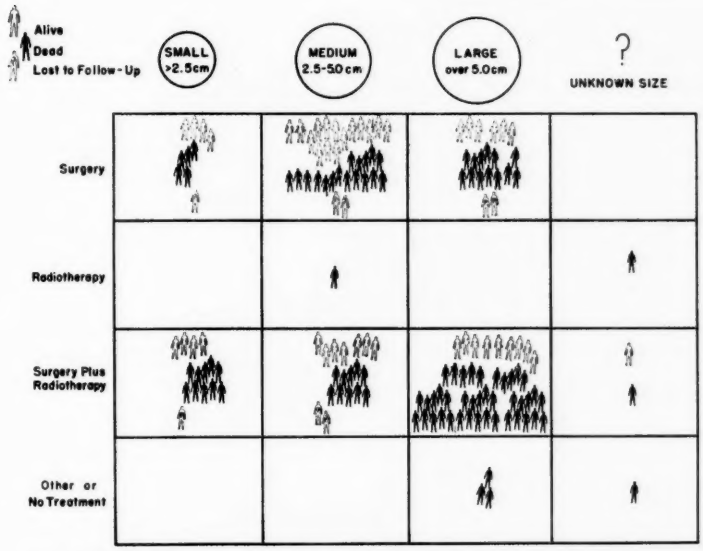

FIG. 11. Five year survival in relation to size of primary tumor; metastases to regional nodes.

error exists among this older age group. Several methods have been suggested to correct this obvious miscalculation. The simplest method being that of Berkson (2) who adjusts the survival rates according to vital statistics for deaths not due to cancer. Another factor of some influence concerns those patients of advanced age who may be treated by means of more conservative surgery because of their older years. This precludes the possibility of a precise comparison because patients are treated by several different surgical techniques.

DISCUSSION

The end results in the treatment of breast cancer at the Johns Hopkins Hospital were first reported by Halsted (15) in 1907. The 3 year survival rate for this pioneer period was 38 per cent. There were 32 per cent of the patients alive and free of disease at this time. The modified 5 year survival rate was 29 per cent with 24 per cent of the patients being alive and free of disease.

Although it is impossible to compare statistically one series of breast cancer patients treated at the turn of the century with another treated 40 years later, yet the variables may be somewhat less disturbing if the two series are within a decade of time and from the same institution. This seems preferable to a critical evaluation of so-called "comparable" series treated in New York, Edinburgh, London, or Rochester. There is bound to be a spurious quality to any comparison of end results based upon two or more series differing both in time and in place. The excellent recent report of Pierce, Kirklin, McDonald, and Gage (25) of the Mayo Clinic points up this ubiquitous problem of variables due to case selection. In their very detailed analysis dealing with the precise site of breast cancer as related to the survival rate Pierce *et al.* found it necessary to eliminate from further consideration 234 of a total of 650 cases. The reasons for these exclusions are quite adequately and carefully explained. However, in all statistical comparisons it is a golden rule to be on guard for the caprice and infidelity of a punch card indexing machine.

In a previous report by Lewison, Trimble, and Griffith (20) there was a total of 255 female patients with primary breast cancer admitted to the Johns Hopkins Hospital between 1935 and 1940, inclusive. However, only 220 of these patients underwent operation, the remaining 35 patients being treated by radiotherapy alone, were found to have distant metastases or lesions hopelessly advanced and beyond treatment, or they refused treatment. Therefore, no further

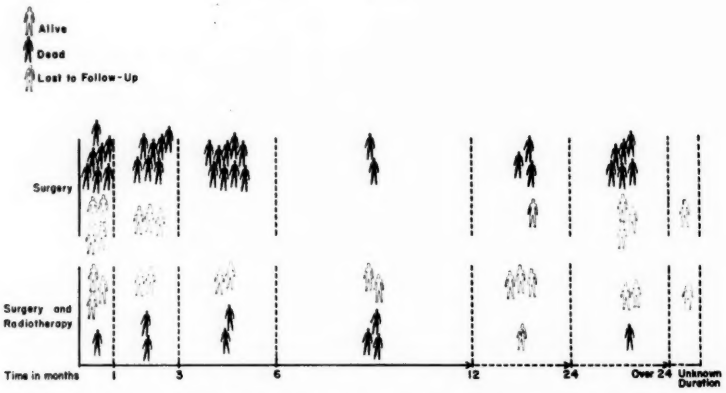

FIG. 12. Five year survival in relation to duration of disease prior to treatment; disease localized to breast alone.

follow-up was undertaken in this group and they were dropped from the study. This is at variance with the present series in which 30 patients with distant metastases or advanced disease (of a total of 259) were carefully followed up and included in the over-all end results. This difference, of course, may account for the variation in the 5 year survival rate which was 43.2 per cent in the period from 1935 to 1940 and only 36.7 per cent in the period from 1941 to 1945. However, if one compares the over-all end results of *radical mastectomy alone* in these two series, then there is very little difference at all; the survival rates being 44 per cent versus 46 per cent. Here, of course, such variables as the type of patient, the criteria and rate of operability, the technique of surgical procedure, and differences in operating personnel are decreased to a minimum due to a general uniformity of therapy at a single hospital.

5 YEAR END RESULTS OF RADICAL MASTECTOMY

Stage	1935 to 1940		1941 to 1945	
	No. of patients	*Survival Per cent*	*No. of patients*	*Survival Per cent*
Localized...	78(38%)	64	59(32%)	71
Regional...	126(62%)	32	126(68%)	34
Total.....	204	44	185	46

It is readily apparent therefore that with regard to the stage of the disease as well as the 5 year survival rate the difference between these two series was surprisingly small if there was a difference at all. The improvement which did occur was limited to that group of patients with breast cancer localized to the breast alone. Although there may be some fluctuation expected from year to year, it is clear that the end results are closely dependent upon the patients selected for treatment (stage of disease) and that any variation in this factor of case selection may very well account for any change in end results. As suggested by Smithers (30) when these end results indicate an improvement, we are tempted to attribute this therapeutic triumph to our surgical skill.

The classical concept on which breast cancer therapy is based is the premise that cancer begins as a localized disease and in the course of time will spread by contiguous growth and via the lymphatics first to the regional nodes and ultimately to more distant sites. A period of time is postulated when the disease has not yet spread beyond the confines of the field of operation and permits the surgeon to eradicate it completely by surgical excision. Radical mastectomy, therefore, meticulously performed at the earliest possible time should give the best chance of cure.

Yet, despite the widespread performance of this operation by increasingly well trained and skillful surgeons over the past 50 years, the breast cancer death rate has remained stationary the world over. International vital statistics collected by McKinnon (22) indicate that the most constant and conspicuous feature of the breast cancer mortality rate as recorded for eight of the Canadian provinces, and for Massachusetts, New York, Connecticut, Minnesota, Missouri,

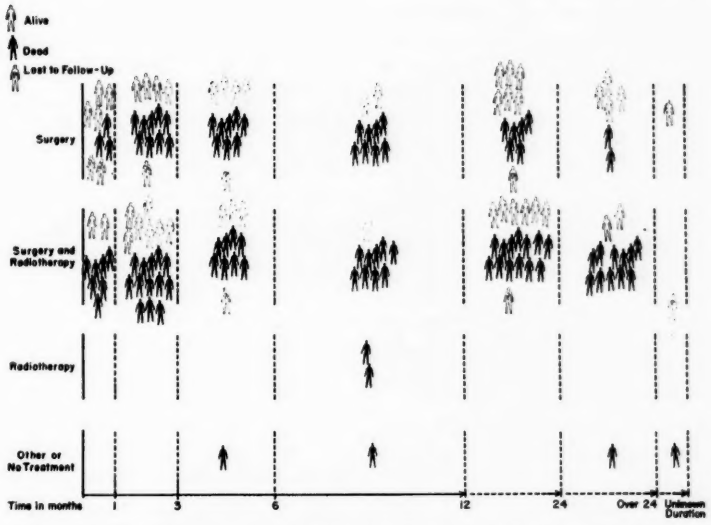

FIG. 13. Five year survival in relation to duration of disease prior to treatment; metastases to regional nodes.

England, Wales, and Denmark is the surprisingly uniform and level trend of this rate (except for the older age groups) over the last 20 to 35 years. As presented earlier in this article, this lack of improvement and level trend has been confirmed by the standardized breast cancer death rates published for the entire United States over the period from 1930 to 1955. These disappointing statistics are apparently true regardless of whether our surgical chauvinism favors Baltimore or Boston or anywhere else with a satisfactory standard of cancer therapy.

In an interesting parallel study Wells (32) compared radical mastectomy in the treatment of breast cancer at the Hartford Hospital in Connecticut with that at the Presbyterian Hospital in New York. The technique employed by Haagensen and Stout (14) in their comprehensive study was "followed as precisely as possible." After the closest statistical correlation in almost every detail, Wells concluded, "The natural history of cancer of the breast treated by a similar surgical method as observed in these two series shows an amazing concordance."

Williams, Murley, and Curwen (34), in an analysis of 1,044 cases seen at St. Bartholomew's Hospital in London, note: "The most impressive finding in this series is the remarkable similarity in the survival rates following different methods of treatment. All the main treatment methods analyzed (simple mastectomy, local excision, radical mastectomy, modified radical mastectomy, each with and without x-ray and radium therapy and radiotherapy alone) seem to have been equally effective in stages 1 and 2. It must, however, be frankly recognized that all methods of treatment may have been equally ineffective in prolonging life." Small and Dutton (29) at the University of Rochester found that "it is doubtful if many more persons are cured by radical mastectomy than by other forms of treatment."

By daring "to beard the lion in his den" Atkins (1) recently addressed the Fellows of the Royal College of Surgeons of Edinburgh and compared the "eclectic" method of treatment of breast cancer at Guy's Hospital, London, with the "didactic" method of McWhirter in Edinburgh. "The thought which really emerges from a preliminary consideration of the effects of these two methods of treatment (radical mastectomy versus simple mastectomy and radiotherapy) is the ugly one that treatment in cancer of the breast makes no difference at all." Atkins then explains this confounding conclusion by saying "that treatment in both categories can modify survival rates although not to the extent that we had thought, and that some

methods are more effective in this respect than others. Nevertheless, the difference (in survival rates) between treatment and no treatment is so small that the difference between one method and another must inevitably be smaller still."

In a 1957 statistical summary from the Mayo Clinic by Berkson, Harrington, Clagett, *et al.* (3) a series of 9,649 cases of breast cancer were reported for the time period between 1910 and 1954, inclusive. During this 45 year period there was a "notable" improvement in the over-all end results. However, "it is to be recognized that the decrease in the proportion of patients with axillary metastasis in successive periods (between 1910 and 1954) could account for this improvement in survivorships." However, if one considers only the more recent period, between 1935 and 1954, the 5 year survival rate for patients with axillary metastases only increased from 41.5 to 46.4 per cent—a 20 year improvement of less than 5 per cent. During this same period of treatment in a more modern time there was *no* improvement in the 5 year end results for patients without axillary metastases. Whereas "statistics are no substitute for judgment," at least these figures for the most recent 20 year period hardly justify the word "notable," in the sense of being remarkable.

Shimkin, Griswold and Cutler (28) state that the "cancer record register of the State of Connecticut, which has been in operation since 1935, most closely answers the requirements for a source of data from which estimates of survival with cancer among the general population can be derived." The 5 year survival rate for breast cancer among females in this registry is recorded as follows:

	1935–40	*1941–46*	*1947–51*
Breast cancer.....	41%	47%	46%

According to these authors this indicates a "possible improvement" in survival rate. However, it is interesting to note that there was a very close correlation in trend between the survival rate and the percentage of cases diagnosed while the lesion was still localized to the breast alone.

	1935–40	*1941–46*	*1947–51*
Breast cancer localized....	39%	46%	46%

Yet, it is indeed disappointing to find absolutely no improvement in the percentage of localized lesions during the two most recent time periods. Despite the fact that breast cancer is a surface tumor and readily accessible for self-examination, there has been very little indication that earlier diagnoses are being made if the proportion of localized lesions is used as the criterion. This has been consistently true of our own experience at the Johns Hopkins Hospital (from 1935 to 1945) where we found quite uniformly that about one-third of the patients had no axillary metastases and two-thirds had axillary metastases when first seen. However, our more recent Tumor Registry statistics indicate a definite improvement is beginning to be evident during the past few years. For the years 1954, 1955, and 1956 the proportion of patients without axillary metastases (stage 1 disease) has increased to 43 per cent, 45 per cent, and 42 per cent, respectively. This is encouraging and should result in an improved survival rate for this period.

In a report prepared by the Third National Cancer Conference (35) called "Cancer at Mid-Century," breast cancer data were submitted by 15 major hospitals, central registers, and cancer specialists. This nation-wide compilation of information was believed to be a fairly representative picture of the situation in the United States during the period from 1940 to 1950. Of the more than 10,000 breast cancer cases reported *the number with localized disease averaged only 32 per cent*, although the individual percentages varied with the type of the hospital and the source of the data.

There is a striking constancy about this relationship which is most disturbing to those of us actively and aggressively participating in the cancer education program which advocates that all women practice breast self-examination. Not only are we failing to find any marked improvement in our survival rate but it seems to me that we are also failing to find a sufficient number of breast cancer cases at the earliest possible time. The criterion of "early" in the matter of diagnosis is measured by the localized lesion or stage 1 disease. This, of course, is both a matter of minutes and months, as well as, a matter of metastases and malignancy. It is, however, well recognized that many a small and localized lesion with a high degree of malignancy or a low degree of host resistance can hardly be considered an "early" cancer. Denoix (9), in a distinguished monograph on this subject, sums up the situation regarding the treatment of breast cancer in Paris by pointing out that, "Present day treatments do not permit the recovery of more than a certain number of *a priori* 'favorable'

cases and we cannot say with certainty whether this is the result of our efforts or not."

The concept that the ultimate solution of the breast cancer problem is to be sought solely in the surgical excision of the malignant lesion is being gradually refuted by an insistent but well grounded group of cancer investigators. There is striking evidence, for instance, that the dissemination of cancer cells into the blood stream is much more common than heretofore realized. Engell (10), of Stockholm, recently found free cancer cells in the efferent vein in 59 per cent of 107 cases of operable cancer of the breast, lung, stomach, and colon. In this country Sandberg and Moore (26) found free cancer cells in the regional vein in 4 of 8 patients with breast cancer and in the peripheral blood in 18 of 36 patients with advanced breast cancer. Therefore, the hematogenous spread of free cancer cells in breast cancer is certainly far from uncommon. Yet, it must be realized that cancer embolism is not necessarily cancer metastasis. The fact that wound washings are so frequently positive for viable-appearing breast cancer cells and yet the incidence of local recurrence is so relatively infrequent (although not as rare as most of us like to believe) may be in part explained by similar factors of host resistance, or perhaps local factors of tissue inhospitality.

Although it has been assumed by some that cancer is entirely an autonomous process little affected by the host, there are many indications that this is certainly not true. The body does possess a varying degree of host resistance both to the primary tumor and to its metastases. It has been shown, for example, that the spleen receives many cancer cell emboli which are most often destroyed before they become secondary deposits. In both clinical and pathological experience metastases to the spleen are quite uncommon. Almost absolute resistance to the development of metastases is also shown by skeletal muscle, probably the largest array of soft tissue in the human body. Breast cancer metastases seldom occur below the elbow or below the knee. The delayed recurrence or metastasis of breast cancer, occasionally developing after a dormant period of 20, 30, or even 40 years, has been noted by numerous clinical observers (24). The precipitating factor in many of the patients is an intercurrent acute febrile or respiratory (viral?) infection; a fulminating malignant disease occasionally developing at a time when the body's defenses are down. These long-term "arrests" in the opinion of an optimist, as indicated by Stewart (31) "are valid spontaneous cures" and they "must occur as the result of some sort of physiologic metabolic interference". Another explanation, however, considered by Collins (5) suggests that some of these long term delays may be due to a prolonged mitotic interval or doubling-time of the tumor cell. Although the rate of increase in the size of a tumor may follow a simple exponential curve, yet a mitotic interval of one year or longer to account for these late (20 or 30 year) recurrences seems to be unlikely.

The spontaneous regression and disappearance of verified malignant tumors occurs infrequently but has been corroborated by a number of competent clinicians. The converse of this is also true. The exacerbation and fulminating dissemination of disease has been occasionally noted following the injudicious use of radiotherapy. Decrease in the natural or acquired resistance to tumors has been produced by many factors which inhibit the reticuloendothelial system.

It is unfortunate that there are no factors which are known to enhance or stimulate the host's resistance. A therapeutic trial using specifically immunized gamma globulin-rich colostrum is currently under study at the Breast Clinic of The Johns Hopkins Hospital. However, as noted by Cohen (4), those factors which lower resistance or the immune response include total body irradiation, the use of colloids to block the reticuloendothelial system, the administration of cortisone, overwhelming doses of antigen, stress, and local trauma. All of these agents can accelerate the growth and spread of cancer, which indicates that immunological processes probably play a part in the prognosis of this disease.

Franks (12) has reported that in certain organs, particularly the prostate, lungs, kidneys, and thyroid, latent cancers can be found with "remarkable frequency." These tumors were observed in a high proportion of cases and suggest some factor of host resistance or a conditional character of growth. "Carcinoma in situ," a term usually applied to preinvasive cancers of the cervix, can also be found in localized lesions of the breast. As suggested by Foulds (11), these lesions are possibly hormone

responsive and, thus, controlled in their progression toward true cancer.

Many investigators, including Gatch (13), MacDonald (21), and Crile (7), have affirmed the concept that the course of breast cancer is chiefly dependent upon the biologic properties of the tumor, as well as upon the resistance of the host. Several years ago MacDonald suggested the term "biologic predeterminism" for this type of host-tumor relationship. He considers this to be of greater prognostic importance than either the time or the type of treatment. Since the precise nature of these defense factors is still unknown, Crile (7) concludes that "no valid generalizations can be made about the treatment of cancer of the breast." Each patient should be considered as an individual problem and treated accordingly. Atkins prefers "the careful assessment of the situation in each case, a studied appreciation of the therapeutic possibilities and a nice discrimination in their selection." Then with the afterthought of a keen clinician and the impulse of an inner voice of conscience, Atkins admits that "what I have written is really what I would like to believe and I have therefore taken special trouble with its expression in order to make it sound convincing." It requires a certain gallantry to confess quite honestly that the criteria for appropriate treatment for the appropriate patient is thus far unknown—merely a mirage of hope. Immunity is one part of the problem of host-tumor relationships and, as indicated in a recent monograph on this subject (33), it holds the fascinating promise of prevention, diagnosis, and treatment.

At present one cannot yet predict with certainty the natural history or clinical course of a patient with breast cancer. To cite but one example:

Etta Smith, J.H.H. 421691, was first seen in 1934, at the age of 63, because of a hard swelling in the left axilla. Surgical excision revealed a "metastatic carcinoma almost completely replacing the lymph node." Complete and careful physical examination failed to find a primary site.

The patient was next seen in 1947, in the Medical Clinic for hypertensive cardiovascular disease. A nodular mass was noted in the left breast but the patient refused surgical treatment.

The patient was again seen in 1956, this time in the Breast Clinic with a large ulcerative tumor of the left breast. A simple mastectomy was performed and revealed "scirrhous carcinoma of the breast." At present this patient is alive, aged but ambulatory, and receiving estrogen therapy for axillary metastases.

This exceptional patient with breast cancer represents a 24 year survival during which time the primary tumor in the left breast remained untreated for 22 years. At the end of a 5 or 10 year period Etta Smith would have been considered "cured" without the benefit of treatment and not because of it. In celebrating our surgical therapeutic triumphs and exulting in our 5 and 10 year end results are we perhaps merely measuring the number of Etta Smiths in our series? Collins (6) has espoused this opinion with a great deal of conviction by pointing out that "the number of patients surviving at 5 years indicates the proportion of breast cancers which grow locally or grow slowly. This proportion is the same for all series of unselected breast cancer and accounts for the uniformity of survival rates reported from centers where careful treatment is carried out despite variations in treatment policies."

Although "we are slow to believe that which if believed would hurt our feelings," yet, an honest and healthy skepticism is not to be regarded as therapeutic nihilism or hopeless pessimism. Neither must the doubt cast upon the efficacy of radical mastectomy be mistaken for a license to perform slipshod surgery. This in itself would further erode the end results by disseminating the disease. If radical mastectomy is to be at all successful, it should be performed by the most skillful surgeon trained in this type of technique.

In an analysis of the present series it was found that there was very little difference between the survival rate for the 1941 to 1945 5 year period compared to the survival rate for the previous 5 year period, if the obvious variables were corrected. The end results for radical mastectomy alone revealed that there was practically no difference in the two series. Postoperative radiotherapy when added to radical mastectomy or simple mastectomy failed to enhance the end results of surgery alone.

The deliberate selection of patients with "advanced" lesions for ancillary radiotherapy must be recognized as one possible explanation for this failure. It is hoped that perhaps newer

and more modern techniques of radiotherapy may improve the future end results. By carefully applied radiotherapy one can combine the restraining effect upon cancer cells with the enhancing effect of the surrounding stroma upon resistance to tumor growth. Then, as Smithers has said, it may be used "as part of an integrated treatment scheme in which, acting as the selective local depressant factor, it may more frequently allow the normal tissue reactions to assert themselves and re-establish the dynamic equilibrium of co-ordinated growth and repair."

The stage or advancement of the disease at the time of treatment is by far the most important single factor in prognosis. The 5 year survival rate for patients with localized disease (operated upon by radical mastectomy) was 71 per cent; for patients with regional metastases the survival rate was only 34 per cent.

Although in the over-all end result there was no convincing evidence that the survival rate was influenced by the location of the tumor, yet in patients with axillary metastases the survival rate was most favorable in those patients with lateral hemisphere lesions.

The prognosis was found to be better for small and medium-sized primary tumors, and least favorable for large lesions. This appeared to be true for those patients who had localized disease as well as for those with regional metastases.

The critical period in the duration of the disease appeared to be between the sixth and twelfth months. The poor end results during this period prevailed regardless of the type of treatment or the stage of the disease.

The 5 year survival rate was somewhat better for younger patients, those 40 years of age or less, regardless of the stage of the disease. However, the complex relationship between age and survival is not easily assessed.

In the present report the duration of the disease, site and size of the tumor, the type of treatment, with or without radiotherapy, and the age of the patient were in themselves rather uncertain factors in the prognosis—merely straws in a wistful wind. Currents and cross currents of biologic behavior flowed beneath the surface and resulted in an unpredictable clinical prognosis. The results of these forces are as yet sheer speculation and their influence on survival cannot be calculated with accuracy.

For practical purposes the ultimate goal in the treatment of breast cancer still remains the removal of the primary tumor with all of its areas of lymph drainage. This, of course, should be done early and most meticulously, before the disease has disseminated (by both blood and lymph channels) beyond the reach of radical mastectomy. Although one cannot predict with certainty that surgical therapy will be either curative or hopeless, it does seem logical to assume that some interval of time does exist early in the clinical course of breast cancer when the disease is still confined to the breast and axillary nodes. For these few cases, which probably represent a disappointingly small proportion of the population with breast cancer, I believe that radical mastectomy will be found to provide the most satisfactory rampart of preservation.

Despite its shortcomings and ineffectiveness in eradicating the entire disease in many cases, it is the best treatment for the operable patient at the present time. Until we learn precisely the right treatment for the right patient, radical mastectomy must serve the whole for the good of the few. Therefore, all of us—profession and public alike—"must become more and more alert to the dangers of breast cancer on less and less clinical evidence." We must discover those small and "early" cancers when they are still confined to the breast alone—before they have cast their shadows before them! Although their number may be small, their gratification will be great.

SUMMARY AND CONCLUSIONS

1. This study presents the 5 and 10 year end results in 259 female patients with primary breast cancer admitted to the Johns Hopkins Hospital between 1941 and 1945, inclusive. A successful follow-up was obtained in 249 of the 259, or 96 per cent. The diagnosis was verified by microscopic examination in 95 per cent of the patients.

2. The absolute 5 year survival rate (including all patients with primary breast cancer admitted to the hospital regardless of the stage of the disease or the type of treatment) was 36.7 per cent. The absolute 10 year survival rate was 23.2 per cent.

3. There were 185 patients of 259 who were treated by means of radical mastectomy. This represents an operability rate of 71 per cent for

this type of operation. The over-all 5 year survival rate for radical mastectomy was 46 per cent. For the 59 patients (32 per cent) with localized disease the 5 year survival rate for radical mastectomy was 71 per cent. The 5 year survival rate was 34 per cent for the 126 patients (68 per cent) having regional metastases.

4. Simple mastectomy was performed in only 17 per cent of the patients and usually in those with advanced disease. The over-all 5 year survival rate was 23 per cent.

5. Postoperative radiotherapy failed to improve the end results of surgery alone. Case selection was probably responsible for these poor results.

6. The site and laterality of the tumor were correlated with the type of treatment, the stage of the disease, and the end results. The location of the tumor appeared to have little influence upon survival.

7. The size of the tumor was correlated with the type of treatment, the stage of the disease, and the end results. The most favorable prognosis was found in small tumors and the least favorable prognosis in large tumors.

8. The duration of the disease was correlated with the type of treatment, the stage of the disease, and the end results. The poorest prognosis occurred when the disease had been present for 6 to 12 months.

9. The end results appeared slightly better in patients 40 years of age or less regardless of the stage of the disease.

10. The 1941 to 1945 end results of treatment at the Johns Hopkins Hospital were compared with the 1935 to 1940 end results and were found to show little or no difference. This level trend in survival rate is discussed in relation to reported results of similar series and in relation to national and international breast cancer mortality rates, which have remained surprisingly stationary in recent years.

11. The uniformity of survival rates with various modes of therapy may be in reality a reflection of host-tumor relationships.

12. The factors of host resistance and the biologic properties of breast cancer are discussed in relation to the appropriate treatment for the appropriate patient.

13. For the patients whose disease is actually confined to the breast and axillary nodes, and they probably constitute a minority of the patient population, radical mastectomy (in preference to other surgical procedures) is the most satisfactory rampart of preservation.

14. Until we learn precisely the proper surgical treatment for the proper patient, radical mastectomy must serve the many for the benefit of the few.

REFERENCES

1. Atkins, H. J. B. Cancer of the breast. J. R. Coll. Surgeons, Edinburgh, 1956, 1: 253–267.
2. Berkson, J., and Gage, R. P. Calculation of survival rates for cancer. Proc. Mayo Clin., 1950, 25: 270–286.
3. Berkson, J., Harrington, S. W., Clagett, O. T., Kirklin, J. W., Dockerty, M. B., and McDonald, J. R. Mortality and survival in surgically treated cancer of the breast; A statistical summary of some experiences of the Mayo Clinic. Proc. Mayo Clin., 1957, 32: 645–670.
4. Cohen, L. Contribution on immunity and resistance in clinical cancer. South Afr. M. J., 1956, 30: 161–167.
5. Collins, V. P. Wilm's tumor; concerning its behavior and prognosis. J. Louisiana M. Soc., 1955, 107: 474–480.
6. Idem. Reasons for failure of treatment among 957 cases of cancer of the breast. Proc. Third Nat. Cancer Conf. Pp. 171–177. Philadelphia: J. B. Lippincott Co., 1957. Also Cancer, 1956, 9: 1177–1181.
7. Crile, G., Jr. Cancer of the breast: The surgeon's dilemma. Cleveland Clin. Q., 1956, 23: 179–185.
8. Idem. Factors influencing the spread of cancer. Surg., Gyn. Obst., 1956, 103: 342–352.
9. Denoix, P. F. De la Diversite de Certains Cancers. Monographie de L'Institut National D'Hygiene, No. 5. Paris: Ministere de la Sante Publique, 1954.
10. Engell, H. C. Cancer cells in the circulating blood. Acta chir. scand., 1955, Supp. 201.
11. Foulds, L. Tumor progression (guest editorial). Cancer Res., 1957, 17: 355–56.
12. Franks, L. M. Latent carcinoma. Ann. R. Coll. Surgeons of England, 1954, 15: 236–249.
13. Gatch, W. D. Changing outlook on cancer and its treatment. J. Ind. M. Ass., 1954, 47: 973–976.
14. Haagensen, C. D., and Stout, A. P. Carcinoma of the breast; results of treatment 1935–1942. Ann. Surg., 1951, 134: 151–172.
15. Halsted, W. S. The results of radical operations for cure of carcinoma of the breast. Tr. Am. Surg. Ass., 1907, 25: 61–79. Also Ann. Surg., 1907, 46: 1–19.
16. Handley, R. S., and Thackray, A. C. Invasion of internal mammary lymph nodes in carcinoma of the breast. Brit. M. J., 1954, 1: 61–63.
17. Johnson, R. E. Deceptive associations found in clinical data. Editorial. Ann. Surg., 1955, 141: 567–572.
18. Lees, J. C., and Park, W. W. The malignancy of cancer at different ages; a histological study. Brit. J. Cancer, 1949, 3: 186–197.
19. Lewison, E. F. Breast Cancer and Its Diagnosis and Treatment. Baltimore: Williams and Wilkins Co., 1955.
20. Lewison, E. F., Trimble, F. H., and Griffith, P. C. Results of surgical treatment of breast cancer at Johns Hopkins Hospital, 1935–1940. J. Am. M. Ass., 1953, 153: 905–909.

21. MacDonald, I. On biological predeterminism in human cancer. Surg. Gyn. Obst., 1951, 92: 443–452.
22. McKinnon, N. E. Limitations in diagnosis and treatment of breast and other cancers, a review. Canad. M. Ass. J., 1955, 63: 614–625.
23. McWhirter, R. Some factors influencing the prognosis in breast cancer. J. Fac. Radiol., 1957, 8: 220–234.
24. Morton, J. J., Jr., and Morton, J. H. Regarding cancer as a chronic disease. Ann. Surg., 1953, 137: 683–703.
25. Pierce, E. H., Kirklin, J. W., McDonald, J. R., and Gage, R. P. Carcinoma in the medial and lateral halves of the breast. Surg. Gyn. Obst., 1956, 103: 759–764.
26. Sandberg, A. A., and Moore, G. E. Examination of blood for tumor cells. J. Nat. Cancer Inst., 1957, 19: 1–5.
27. Shimkin, M. B. End results in cancer; introductory remarks. Proc. Third Nat. Cancer Conf. Pp. 835–839. Philadelphia: J. B. Lippincott Co., 1957.
28. Shimkin, M. B., Griswold, H., and Cutler, M. A. Survival in untreated and treated cancer. Ann. Int. M., 1956, 45: 255–267.
29. Small, R. G., and Dutton, A. M. Survival of patients with carcinoma of the breast. J. Am. M. Ass., 1955, 157: 216–219.
30. Smithers, D. W. Progress in the treatment of breast cancer. Lancet, Lond., 1952, 263: 495.
31. Stewart, F. W. A study of the factors influencing the curability of cancer. Proc. Third Nat. Cancer Conf. Pp. 62–74. Philadelphia: J. B. Lippincott Co., 1957.
32. Wells, D. B. An audit of the treatment of breast cancer at the Hartford Hospital, 1932–1939. Connecticut M. J., 1950, 14: 3–15.
33. Otto v. St. Whitelock. Editor. Immunology and Cancer. Ann. N. York Acad. Sc., 1957, 69: 525–856.
34. Williams, I. G., Murley, R. S., and Curwen, M. P. Carcinoma of the female breast; conservative and radical surgery. Brit. M. J., 1953, 2: 787–798.
35. Cancer at Mid-Century. Proc. Third Nat. Cancer Conf. Philadelphia: J. B. Lippincott Co., 1957.
36. Research Commission of the International Union Against Cancer. Clinical Stage Classification of Malignant Tumors of the Breast. (1956 Draft).
37. A standardized method for reporting end results in cancer. Bull. Am. Coll. Surgeons, 1953, 38: 149.
38. United States National Office of Vital Statistics, 1930–1955. U. S. Government Printing Office.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Postoperative Parotitis; a Reappearing Disease. J. Vickers Brown, Joseph L. Sedwitz, and Joseph M. Hanner. *U. S. Armed Forces M. J.*, 1958, 9: 161.

Acute parotitis is beginning to reappear as a postoperative complication in the opinion of the authors of this article.

Two patients developed acute parotitis from July 1, 1949 to July 1, 1956. During this period 171,826 major and minor operations were performed. From July 1, 1956 to July 1, 1957, 47,947 major and minor procedures were done, and 7 of the patients developed acute parotitis following operation. This represents a twelvefold increase in this complication. Cultures taken from these 7 patients showed the presence of micrococcus pyogenes var. aureus in 5. The authors believe the reappearance of acute parotitis is related to the increasing number of carriers of antibiotic-resistant staphylococci found in every hospital community.

The prevention of this disease is empirical. All of the methods used in decreasing and controlling antibiotic-resistant organisms should be used in preventing acute parotitis. Attention to proper oral hygiene and stimulation of the salivary flow are necessary. Definitive care included the use of chewing gum and sucking of hard candy to stimulate salivary flow. The application of moist heat was of additional value. Massive doses of antibiotics were used, the authors preference being erythromycin and gantrisin. Irradiation therapy was an important factor in management. Surgical drainage was used as indicated.

Brief reports of the 7 cases of this complication are included. Frequently acute parotitis was one of several complicating diseases. There were 2 other deaths, in one of which it was believed acute parotitis was definitely contributory. Early diagnosis makes for successful treatment. The disease is considered to be a serious postoperative complication.

—*Donald C. Geist, M.D.*

Two Cases of Cystic Adenolymphoma of the Parotid Area (Considerazioni su due casi di cistoadenolinfoma della regione parotidea). L. Miselli. *Arch. ital. mal. app. diger.*, 1957, 23: 423.

Papillary cystic adenolymphoma is a slow-growing, usually benign, tumor situated at the angle of the mandible just below the parotid gland. It is frequent in middle and advanced age (50 to 75 years of age). It is rarely seen in children though Storh and Risak described a case in a child of 2 years. Macroscopically, the tumor is of moderate size, never exceeding the size of a small orange. It is well encapsulated, of elastic consistency, mobile, and smooth of surface. On cut section, it shows numerous cavities containing a mucinous material. Histologically, the tumor shows a lymphorecticular stroma in which are contained young and adult cells of the lymphatic type. The cystic cavities occasionally contain eosinophilic granular material with few leucocytes and squamous epithelial cells. Small papillary formations may form in the cystic spaces. More than 100 cases have been reported in the literature, and with increasing frequency in the last few years. Two personal cases are reported.

In the 2 cases presented there was an abundance of lymphatic tissue, mature lymphocytes with pseudofollicular formation and glandular tissue with tubular cystic and papillary structure. The epithelial cells were characterized by large acidophilic cytoplasm with a small ovular nucleus located centrally or peripherally.

There are two theories to explain the histogenesis of this tumor, one that it is of salivary gland origin, and the other that it is of branchial origin.

Although one cannot positively exclude one or the other theory the author favors the theory that the cystoadenolymphoma is of branchial origin, and that the tumor is derived from embryonal elements remaining in an area where similar processes, like branchial cysts and fistulas, are often seen.

—*Alexander J. Conte, M.D.*

EYE

The Ageing Eye; President's Address. J. R. Wheeler. *Proc. R. Soc. M.*, Lond., 1958, 51: 17.

The Registrar-General's population projection indicates that the number of individuals over 85 years of age will double within 40 years. Maximum physical potential is achieved in the middle twenties; the first consistent sign of ageing is presbyopia and the next is the onset of the postreproductive period. The degenerative conditions are classified as (1) secondary to reduced blood supply, (2) of genetic origin, and (3) resulting from cumulative trauma. A three part survey is reported covering (a) 2,600 registered blind individuals more than 65 years of age in Northern Ireland, (b) 277 inmates of a geriatric nursing

unit more than 65 years old, and (c) 138 essentially healthy pensioners in an old person's retreat.

Among the registered blind 31 per cent had cataracts and 20 per cent glaucoma. The majority of these had not sought medical care, which would salvage most of them. In the geriatric nursing unit 58 per cent had frank vascular lesions, but aside from sclerotic retinal changes, serious eye diseases (especially glaucoma and cataract) were present in only 13 per cent; good medical control of hypertensive disease is credited with visual preservation in many of this group. Of the healthy residents of the old person's retreat 90 per cent were able to read, and the incidence of degenerative eye pathology paralleled that of cerebral degeneration.

—*Arthur H. Keeney, M.D.*

Buried Orbital Implant with Extraconjunctival Extension. STANISLAW GEBERTT. *Brit. J. Ophth.*, 1958, 42: 54.

THE AUTHOR discusses an orbital implant which he believes gives the benefits of good retention and an excellent cosmetic result, which are not found with any other prosthesis now used. It is a buried implant with four gold prongs extending extraconjunctivally to act as support for a round acrylic platform. This method makes possible retention of a buried implant and the movements and cosmetic results which are desired.

Exact details for the operative procedure are given in the article and drawings are included. Four implants have been in place since 1953, 4 since 1954, 3 since 1955, and 3 have been removed.

—*Earl H. Merz, M.D.*

Mycotic Keratitis. THOMAS E. HAGGERTY and LORENZ E. ZIMMERMAN. *South. M. J.*, 1958, 51: 153.

SINCE THE ADVENT of antibiotic and steroid therapy, corneal and intraocular mycotic infections, with species of Candida and Aspergillus, are encountered with increasing frequency. Secondary infection with these fungi in cases of severe corneal lesions treated with antibiotics and steroids can be easily overlooked, unless the possibility of their presence is kept in mind and a search for them is made. The diagnosis is important as the discovery of fungi demands immediate withdrawal of antibiotics and steroids.

The author reports 3 cases, one of glaucoma with bullous keratitis, one of corneal abscess from exposure keratitis, and one of traumatic corneal ulcer in which the course of the disease ended in enucleation. Fungi were found in the microscopic sections of these enucleated eyes.

—*Ray K. Daily, M.D.*

Tattooing the Cornea. KENNETH PICKRELL, NICHOLAS GEORGIADE, JOSEPH KEPES, and ROBERT WOOLF. *Am. J. Surg.*, 1958, 95: 246.

FROM THE DEPARTMENT OF PLASTIC SURGERY at Duke University, Durham, North Carolina, the authors report on more than 100 corneal tattoos done in the last 10 years. The history and physiology of this procedure are reviewed rather thoroughly. Insoluble inorganic pigments are used. Surgery is done under local or general anesthesia, but cocaine is avoided because it softens the corneal epithelium. A speculum is inserted in each eye for comparison as the tattooing proceeds. Multiple pricks are inserted at 45 degree angles to the corneal surface to deposit short lines rather than dots of pigment. Forceps trauma to the conjunctiva is avoided because pigment might embed in such areas. Saline irrigation is used repeatedly to free the operative area of stray pigment. Impregnation is usually completed in one operation, but at times a second and third may be required at intervals of about 6 weeks.

In addition to traumatic scars, heterochromia and keratoconus are treated by this method by the authors. Consultation and co-operation between the plastic and ophthalmic surgeon is stressed.

—*Arthur H. Keeney, M.D.*

Partial Lamellar Corneal Grafts in Rabbits; Histologic Observations of the Survival of the Stromal Cells. WALTER KORNBLUETH and EDITH NELKEN. *Am. J. Ophth.*, 1958, 45: 242.

THE OBJECTIVE of this experimental investigation on rabbits was to determine the fate of the stroma cells in lamellar corneal grafts. The material for the investigation comprised 150 eyes of 90 rabbits. In the first 94 eyes treated successful grafts were obtained in 21 per cent. As the technique improved clear grafts were obtained in 55 per cent of the last 52 eyes.

A study of the histologic sections of eyes enucleated at various intervals after the operation shows clearly that, contrary to the opinion of Bonnefon and Lacoste who thought that nearly all of the fixed cells of a lamellar graft die within a short period of grafting, a great proportion of the stromal cells survive. Histologic sections of the lamellar grafts from as early as 12 hours and up to 7 months after transplantation showed that the great majority of the stromal cells survived. Massive destruction of the stromal cells was never encountered, and the only areas poor in cells were found near the wound edges where the stromal cells were damaged by the trephine blade.

The technique for successful corneal grafting in rabbits is described. The most important step seemed to be the immediate exchange of grafts after they were removed from the cornea. This was accomplished by timing the removal of the grafts which was performed simultaneously by two surgeons.

—*Ray K. Daily, M.D.*

Idiopathic Atrophy of the Epithelial Layers of the Iris and Ciliary Body; a Clinical Study. HAROLD G. SCHEIE and HANS W. FLEISCHHAUER. *Arch. Ophth.*, Chic., 1958, 59: 216.

THIS IS THE REPORT of a clinical study of 97 eyes in 49 patients that had intraocular pigment changes due to an atrophy of the epithelial layers of the iris and ciliary body.

The condition consists of punctate pigment deposits on the corneal endothelium, usually in the form of the Krukenberg spindle, pigment on the anterior surface of the iris, pigmentation of the trabecular area of the anterior chamber, and pigment on the posterior surface of lens near the equator. This is all associated with atrophy of the iris and ciliary body, and in many cases with simple open angle glaucoma. The glaucoma is thought to be due to obstruction of the outflow.

No treatment is known for the primary condition, but the glaucoma responded well to medical treatment in 27 of the 42 eyes. In cases treated with surgery, a filtration type of operation was found to be successful.

All cases of heavily pigmented trabecula should be carefully followed up for future development of glaucoma. —*Earl H. Merz, M.D.*

Primary Tumors of the Iris. JAMES R. DUKE and SHEPARD N. DUNN. *Arch. Ophth.*, Chic., 1958, 59: 204.

THE AUTHORS report 43 primary tumors of the iris seen at Wilmer Institute between 1925 and 1956.

Thirteen of these tumors were benign and 28 were malignant. All occurred in white individuals and their average age was 42 years. Glaucoma occurred in 33⅓ per cent and the angle was invaded by tumor cells in all of the cases except one. The types of cells were spindle-cell A and B, but the mortality was quite low. Early visible diagnosis and iridectomy for biopsy seem to play an important part in the low mortality rate. —*Earl H. Merz, M.D.*

Recent Advances in the Management of Retinal Detachment. GUILLERMO PICÓ. *Am. J. Ophth.*, 1958, 45: 227.

THIS is a comprehensive review of the literature, with emphasis on the surgical advances developed since 1950. The operations of scleral resection and vitreous transplantation are described.

On the still controversial subject of postoperative bed rest, the author allies himself with the proponents of postoperative confinement to bed for several weeks, and postoperative wearing of pinhole spectacles.

—*Ray K. Daily, M.D.*

Experience of Treating Retinal Venous Occlusion with Anticoagulant and Antisclerosis Therapy. SALME VANNAS and HETA ORMA. *Arch. Ophth.*, Chic., 1957, 58: 812.

THE AUTHORS discuss 33 patients with retinal venous occlusion, either central vein or main branch occlusion, who were treated with anticoagulant therapy alone or with anticoagulant therapy combined with antisclerotic therapy. Thirty-six patients who were not treated constituted a control group. Anticoagulant therapy consisted of heparin and dicumarol or trombosol. Anti-arteriosclerotic therapy consisted of heparin in small doses and vitamins E and A.

Short term therapy consisted of anticoagulant treatment for 10 days to 3 weeks. Long term therapy, which included anticoagulant therapy and antisclerotic therapy, consisted of intensive heparinization for 10 to 14 days followed by the oral administration of 100 milligrams of vitamin E 3 times a day with or without vitamin A. One hundred milligrams of heparin sodium twice a week either with vitamins A and E or alternately with them were then given. This treatment was continued for months or years. The type of retinal venous occlusion and the presence of sclerotic manifestations in the fundus and elsewhere determined the type of therapy used. Calcium and rutin were usually administered also and frequently vasodilators were used. The control group received medical treatment, calcium and rutin, and sometimes vasodilators.

Vision, visual field changes, fundus changes, and secondary glaucoma were the factors considered in evaluating the results of therapy. In 22 patients with central vein occlusion, the result was good in 46 per cent, fair in 23 per cent, poor in 19 per cent, and nil in 12 per cent. Despite the presence of secondary glaucoma in 5 cases, a good or fair result was achieved. In 11 main branch occlusions, the result was good in 91 per cent and fair in 9 per cent. In either group, those cases with sudden onset and a short interval before therapy was instituted had the best prognosis. In the control group, there were 17 central vein occlusions and 19 main branch occlusions. The results in the central vein occlusions were poor or nil in 88 per cent and fair in 12 per cent. The results in the group with main branch occlusions were good in 26 per cent, fair in 42 per cent, and poor or nil in 32 per cent. —*J. Jack Stokes, M.D.*

Comparative Studies on Anesthetic Properties of Primacaine Hydrochloride (HCL). HAROLD G. SCHEIE and NEIL S. WILLIAMS. *Arch. Ophth.*, Chic., 1958, 59: 81.

THE AUTHORS report their comparative studies on the anesthetic properties of primacaine HCl (2'-diethylaminoethyl 2-butoxy-3-aminobenzoate hydrochloride).

Clinical and experimental work with this new local anesthetic agent was performed in the search for a local anesthetic of sufficient duration to avoid the period of acute postoperative pain which follows ocular surgery.

An anesthetic of this type would overcome restlessness, nausea, and vomiting, which are often aggravated by sedatives and analgesics and enhance the general welfare of the patient. The period of most excruciating pain usually begins within 1 to 2 hours and disappears in from 8 to 10 hours postoperatively.

Efocaine caused a severe reaction at the site of its injection. U-0045 was satisfactory for retrobulbar anesthesia when combined with 1 c.c. of 2 per cent procaine HCl (yielding 0.12 per cent U-0045); anesthesia persisted for from 8 to 12 hours. However, stronger solutions than 0.2 per cent caused local tissue irritation when injected intracutaneously into the anterior chamber of the rabbit eye.

Scheie, in 1955, reported a method of maintaining continuous retrobulbar anesthesia by repeated injections of a local anesthetic solution postoperatively through a fine polyethylene tube, one end of which rested in the muscle cone. It is also useful for the relief of pain in acute congestive glaucoma and for repeated paracentesis. This method has been safely used in more than 700 patients.

In the present study the retained polyethylene tube technique was used for the clinical evaluation of procaine HCl, lidocaine HCl, and primacaine HCl.

The anesthetic effect of primacaine HCl, which is being used at present for dental surgery, lasts about 2.5 to 3 hours. Monheim has used it for infiltration and for mandibular, infraorbital, and tuberosity block anesthesia in 470 patients; Rogers has used it in 300 patients. Both reported prompt and profound anesthesia and concluded that it is an excellent anesthetic.

The experimental effect of retrobulbar injections made with primacaine HCl 1.5 per cent, with and without hyaluronidase, were compared with those of tetracaine HCl 0.1 per cent, lidocaine HCl 1.0 per cent, and procaine HCl 2.0 per cent. The average duration of primacaine HCl was 95 minutes without hyaluronidase and 60 minutes with hyaluronidase. Primacaine HCl has a duration of approximately one hour longer than that of procaine HCl or of lidocaine HCl.

The effect of pilocarpine upon postoperative pain when it was instilled at the time of cataract extraction was also evaluated. The time of onset of pain was approximately the same whether or not pilocarpine was used but began approximately one hour later with primacaine HCl than with procaine HCl or lidocaine HCl.

The authors conclude that prolonged anesthesia by repeated injections through a polyethylene tube retained in the muscle cone is not an ideal method. They suggest that a further search for an ideal long-lasting anesthetic solution should be continued.

They conclude that primacaine HCl is an excellent nonirritating, safe, nontoxic anesthetic for ophthalmic surgery. Because it differs chemically from procaine HCl, its use is also permissible in patients who are sensitive to procaine HCl.

—Joshua Zuckerman, M.D.

EAR

An Explanation of the Pathogenesis, Physiology, and Therapy of Meniere's Disease. MAYNARD MURRAY and WILLIAM R. STEWART. *Arch. Otolar.*, Chic., 1958, 67: 184.

THE AUTHORS subscribe to the theory formerly propounded by certain investigators that the etiology in Meniere's disease, or hydrops of the labyrinth, is found to be foci of infection. They further narrow down the site of the focus in their illustrated cases to dental pathology. They have cited 9 cases in which "alveolectomy" was followed by relief of dizziness whether or not dental extractions had been previously performed. One case is cited in which the wearing of an "onlay splint" was followed by complete relief from dizziness. *—John R. Lindsay, M.D.*

Otosclerosis, a 20 Year Retrospect; President's Address. I. SIMSON HALL. *Proc. R. Soc. M.*, Lond., 1958, 51: 57.

THE HISTORY of the surgery of otosclerosis is briefly reviewed and the three general groups of theories concerning its origin are mentioned, viz., (1) the vascular theories of Wittmaack and of Wolff, (2) the theories of absorption by lacunar erosion and progress of the disease along the blue mantle, and (3) theories concerning the embryological remnants found in the temporal bone. All these theories assume a disease entity, but the author emphasizes that he has observed nothing but signs of healing bone and suggests that the symptoms of otosclerosis are the result of a healing process. There may be a fundamental embryological abnormality of the bone similar to the lack of osteoblastic tissue found in fragilitas ossium which, in its healing, produces otosclerosis. The author's anesthetic of choice was thiopentone, followed by nitrous oxide and oxygen plus a volatile anesthetic as required. Hypotension was induced to between 60 and 88 mm. Hg. It is emphasized that this type of surgery should not be practiced by the occasional operator.

In measuring the success of surgery in otosclerosis the achievement of social adequacy is not always essential. The two features necessary before a case can be regarded as a success are a significant rise in the audiogram and a patient who is satisfied with the result. Details are given of the author's results obtained over a period of about 12 to 13 years in 752 cases. In general the results showed that the changes in technique which have been made since 1942 have led to improved results; the exception was the cartilage implant technique which gave the poorest results. The highest success rate (90 per cent) was achieved using controlled hypotension. Unfortunately 35.3 per cent of subjects in this group could not be traced, whereas in the three earlier groups a total of only 12.2 per cent of cases were untraced.

The method of approach to the semicircular canal is of less importance than the mode of entry into it. The author used Thiersch grafts in the cavities, but in 13 per cent of the cases there was a persistent discharge—a problem of great importance and magnitude and often attributable to infected posterior cells. Disorders of balance after surgery have been minimized by the use of Cawthorne-Cooksey exercises. Fenestration cavities require careful after-attention, particularly during the early stages; surf-riding and diving must always be forbidden. Bilateral fenestration was found to have a limited place. Vertigo occurred more often after the second than after the first operation. The author mentions stapes mobilization briefly, expressing his firm belief in its scope and application, and states that he now never performs fenestration without first attempting mobilization. *—John R. Lindsay, M.D.*

Stapes Mobilization for Otosclerotic Deafness; the Monitored Peribasal Technique. VICTOR GOODHILL. *California M.*, 1958, 88: 114.

CLINICAL OTOSCLEROSIS is the most common cause of deafness in adults. In its usual form, otosclerotic bone invades the anterior limb of the footplate of the stapes and the medial aspect of the anterior crus of the stapes. With progressive loss of mobility the symptoms of progressive hearing loss, tinnitus, and, occasionally, vertigo are produced. Usually no abnormalities are seen on examination of the ear or eardrum. Hearing tests show, characteristically, a pure conductive type of hearing loss with bone conduction longer than air conduction.

Fenestration has been performed successfully since 1938, and has resulted in improvement of hearing loss from otosclerosis. Mobilization of the stapes was revived in 1952, after a lapse of 50 years.

The article properly stresses that although stapes mobilization is performed under local anesthesia, can be done on patients of any age, and has a low morbidity factor, it is still a precise and highly intricate anatomic procedure requiring microsurgical technique. The article also, rightly, emphasizes that this

procedure should be done only by those prepared by training and experience to perform a fenestration operation subsequently if necessary.

The obvious advantage of stapes mobilization over fenestration is that the normal anatomy of the middle ear is preserved when successful restoration of hearing is obtained. In fenestration a portion of the ossicular chain must be sacrificed.

Rosen's original description of stapes mobilization—in which mobilization was accomplished by pressure through the incudostapedial joint or direct pressure on the head and neck of the stapes—has resulted in incudostapedial dislocations and fractures of the crura, both of which sequelae are undesirable. In either case the footplate of the stapes remains fixed. Goodhill's technique is one of direct approach to the footplate and careful breaking of the anterior or posterior footplate fixation. The technique is described in detail, and should be read to be appreciated.

Artists' drawings, which accompany the article, although clear and understandable, tend to oversimplify the problem of visualization of the footplate of the stapes and the two crura. The author's experience with 100 cases of direct fenestration of the footplate, as advocated by some surgeons in this field, has been disappointing and has not given satisfactory results.

Results of mobilization of the stapes by the peribasal technique are given as 62 per cent successful, 29 per cent significant, and 9 per cent failure. This is compared with 43 per cent successful, 24 per cent significant, and 24 per cent failure when the indirect method of mobilizing through the incudostapedial joint was used. No information is given as to the length of the postoperative period represented by these results. —*David D. DeWeese, M.D.*

The Development of Stapes Surgery After 5 Years. SAMUEL ROSEN. *Arch. Otolar.*, Chic., 1958, 67: 129.

THE AUTHOR describes and evaluates his three surgical methods for alleviating otosclerosis. The first may be described as the direct method since, after exposure of the middle ear structures by reflection of a portion of the ear drum and removal of any of the bone of the posterior canal wall which conceals the incus and stapes, the force necessary to mobilize the rigid stapes is applied at the stapes neck. This method may fail if the footplate is too rigidly fixed or if the stapedial crura give way under the mobilizing force.

The second method, referred to as the indirect method, consists of the application of sharp-pointed explorers to the margin of the footplate. Movement of the explorers in a prying fashion will then often completely mobilize the stapes.

When all direct and indirect mobilization techniques have failed, the author advocates his third method—fenestration of the stapes footplate with a hooked fenestrating probe. It is emphasized that the surgeon's sense of feeling is important in this operation and must be developed by repeated practice with the fenestrating probe on cadaver and other inanimate material. Stapes surgery generally is complex and cannot be standardized because the configuration of the stapes and disease may be different in every case. In the author's series of cases proportionately better results were obtained by the stapes fenestration technique than by either of the other two methods, and analysis of 254 unselected cases (including some of the most and the least suitable for surgery) showed that 77 per cent of the patients subjected to stapes surgery one or more times, by any or all of the techniques described, obtained significant hearing improvement.

The author states that the stapes fenestration technique may result in complete recovery of hearing despite removal of the incus, and hearing may return gradually. In the 30 months he has used this fenestration technique only 11.6 per cent of his 77 cases with improvement regressed to or near to their preoperative hearing level. —*John R. Lindsay, M.D.*

Scope of Surgery in Management of Deafness. I. B. THORBURN. *Brit. M. J.*, 1958, 1: 200.

THE AUTHOR reviews advances in the surgical treatment of conduction deafness which have taken place in the last 25 years. The main factors which have influenced progress are the use of magnification by loupe or microscope and the control of infection by antibiotics. The success of the fenestration operation depends upon the suitability of the patient and the surgeon's competence; 85 per cent of the author's second hundred cases were improved to or beyond the 30 db. level. Stapes mobilization has been reported to give good results in 35 per cent of the cases, but the author feels it unwise to risk labyrinthine trauma from further stapes surgery if direct mobilization fails, and prefers subsequent fenestration.

Tympanoplasty is a development of major importance, presenting a creative approach to the dual problem of infection control and alleviation of deafness in disease of the middle ear. The author supplements the pioneer work of Wullstein and Zöllner on tympanoplasty by five principles upon which, he claims, this type of surgery should be based. The principles are: (1) precision microsurgical technique; (2) the assessment of pathologic conditions of the middle ear as reversible or irreversible; (3) the use of antibiotics to control chronic reversible disease; (4) full thickness skin grafts to provide a satisfactory medium for the plastic reconstruction of a new tympanic cavity; and (5) the basic physical principles of leverage and phase differential that determine the adequacy of middle ear conduction.

—*John R. Lindsay, M.D.*

NOSE AND SINUSES

Reconstruction of the Harelip Nose. CLAIRE L. STRAITH, RICHARD E. STRAITH, and JAMES M. LAWSON. *Plastic & Reconstr. Surg.*, 1957, 20: 455.

THE AUTHORS discuss a method of Z-plasty in two planes to relieve the common flattening of the nasal tip and nasal ala that follows cleft lip repair.

The technique is as follows:

1. An incision on the inner aspect of the upper half of the columella is made continuous with an incision in the upper half of the nasal aperture. This procedure creates a triangular flap with a hinged base.

2. The alar cartilage exposed by the first incision is removed.

3. An inner triangular flap, hinged at the columella, is formed by incising along the alar rim.

4. A second flap is rotated and sutured to the original columellar incision.

5. The first flap is turned in around the ala in its superior half and sutured to the upper lateral wall of the nasal vestibule.

The article is accompanied by simple drawings illustrating the technique. There are also photographs which illustrate the results achieved. The procedure can be performed on one or both nostrils, and appears to accomplish the purpose of elongating the columella and adding symmetry to the nasal vestibule. The article should be read for detailed explanation of the incisions. —*David D. DeWeese, M.D.*

The Natural History of Malignant Granuloma of the Nose. M. M. SINGH, J. F. STOKES, R. A. B. DRURY, and J. M. WALSHE. *Lancet*, Lond., 1958, 1: 401.

THE AUTHORS review the historical background of malignant granuloma of the nose, which was originally described in 1897 by McBride. Other terms used to describe this disease are progressive lethal granulomatous ulceration of the nose, lethal midline granuloma, and granuloma gangrenescens.

This disease is more frequently seen in the young adult and the frequent sites of location are nose, paranasal sinuses, middle ear, or nasopharynx. Progressive destruction of the nose, face, and pharynx with no apparent resistance is the usual course of the disease. Death usually occurs from cachexia or severe hemorrhage. Histological examination reveals necrotic granulomatous tissue and nonspecific cellular reaction; giant cells are not found and no organism is consistently isolated. Systemic lesions are usually accompanied by a widespread necrotizing angiitis. Some authors have reported that the systemic nature of malignant granuloma is not generally appreciated. Several workers have suggested that the disease may be a form of polyarteritis nodosa. Rose and Spencer (1957) reported that upper respiratory granulomata were an early feature in 5 of 111 cases of polyarteritis nodosa.

The authors of this article report in detail 4 cases of malignant granuloma of the nose. They were impressed in all of these cases by the consistent shape of the illness which has three stages:

1. A minor rhinological lesion, usually nasal obstruction, with serosanguineous discharge or sinusitis. Commonly, operation is done in this stage, but there is no indication of the future course of the disease at this time.

2. The development of local destructive granuloma.

3. The late appearance of systemic lesions.

The patient may die at stage 2 from local complications or at stage 3 from either local or systemic effects—commonly renal failure.

The authors state that although the etiology of the condition is at present unknown, they believe that a hypersensitivity reaction of some sort is the most probable explanation of the systemic lesions. Neither antibiotics or steroids have produced more than short-lived temporary improvement in those patients who have died from the effects of the local lesion. X-ray therapy, however, seems to have been definitely beneficial in some cases. If further experience shows that radiotherapy is capable of halting the local lesions, it becomes even more important to prevent the development of systemic lesions. No treatment so far reported has been of any value once the systemic lesions have appeared. If they are due to a hypersensitivity reaction, then the use of antibiotics can be of no value and may even be provocative. Steroid treatment, on the other hand, would be rational. Its use so far has proved disappointing but this might well be because it has been given too late.

In the authors' opinion, if a patient develops malignant granuloma, treatment with full doses of steroids should be started at once. This could be combined with local roentgen therapy. It seems that only a combination of radiation and adequate cortisone therapy may yield better results. Antibiotics should be avoided. In the 4 cases described in this article the patients died from malignant granuloma of the nose; 3 of these had had systemic involvement. The authors conclude that steroid hormones may have a place in the treatment of this devastating disease. —*G. Obregon, M.D.*

MOUTH

Method of Preventing Raw Area on Nasal Surface of Soft Palate in Push-Back Surgery. THOMAS D. CRONIN. *Plastic & Reconstr. Surg.*, 1957, 20: 474.

THE AUTHOR describes a method of covering the nasopharyngeal surface of the palate during a "push-back" procedure for cleft palate repair. He argues that there is often an undesirable shortening of the palate during the postoperative period following the customary push-back procedure because of the raw area that is usually left in this position.

In this technique available intranasal instruments are used. A transverse incision is made across the floor of the nose, 1.5 to 2 cm. from the posterior rim of the bony floor. A mucoperiosteal flap is mobilized with medial and lateral incisions. This flap is slid backward to cover the superior aspect of the nasopharyngeal surface of the soft palate.

The article is accompanied by excellent line drawings. The detailed description of the technique should be read for complete understanding. No cases are reported.

The procedure appears to be practical, and should not cause difficulty as far as the nose is concerned. Any lengthening and mobility of the palate it accomplishes should be valuable in later speech rehabilitation. —*David D. DeWeese, M.D.*

Cirrhosis and Other Predisposing Factors in Carcinoma of the Tongue. NORMAN TRIEGER, IRWIN I. SHIP, GRANTLEY W. TAYLOR, and DAVID WEISBERGER. *Cancer*, 1958, 11: 357.

THE PRESENT STUDY was undertaken to review the relationship of a variety of supposed etiological agents to carcinoma of the tongue in all patients with this disease seen at the Tumor Clinic of the Massachusetts General Hospital, Boston, during the period from 1946 to 1957. Etiologically, several factors are suggested in the literature. The association between lingual cancer and syphilitic glossitis has been well

established. The successful treatment of oral leucoplakia with estrogenic hormones by Nathanson and Weisberger suggested that a possible deficiency or alteration in the metabolism of sex hormones might evoke a substrate change that renders these patients more susceptible to the development of mucosal cancer.

These patients were investigated in regard to four particular factors: the use of tobacco, alcohol consumption, syphilis, and chronic oral trauma. Of the 108 patients 89.8 per cent were classified as smokers; 18.5 per cent had evidences of syphilis and 19 of these 20 patients had carcinoma of the anterior two-thirds of the tongue. Syphilis is not significant in lesions of the posterior third and base of the tongue. Unequivocal evidence of hepatic cirrhosis was found in 44.4 per cent and 70 per cent had evidence of long-standing oral irritation. Of the 108 male and female patients, 86.6 per cent had a combination of some or all of the 4 predisposing factors previously mentioned. In the 14 women patients in this series, the only significant finding was their lack of conformity to the proposed 4 etiological categories. Eleven of the 14 women were postmenopausal. There were 4 cirrhotics in this group. It is striking to realize that 2 of every 5 patients with carcinoma of the tongue seen at the Massachusetts General Hospital were cirrhotic and more than 3 of every 5 were heavy drinkers.

The over-all impression gained from the data presented in this study is that carcinoma of the tongue is due to a number of etiological factors acting together. —*Alan Thal, M.D.*

PHARYNX

Benign Peripharyngeal Tumors (I tumori benigni perifaringei). M. MARGOTTINI and A. FICARI. *Chir. pat. sper.*, 1957, 5: 937.

FIVE BENIGN PERIPHARYNGEAL TUMORS are reported from the Elena Regina Institute for the Study and Cure of Tumors, Rome, Italy.

The first case was that of a 46 year old agricultural worker who had begun, 10 years previously, to complain of dysphagia. This was attributed to tonsillitis. A year later a tumefaction developed in the left lateral cervical region. The swelling was aspirated with negative results. The dysphagia gradually became worse and dyspnea occurred when the patient was lying down.

At operation the neoplastic mass was found to have pushed the sternocleidomastoid muscle, the carotid artery, and the jugular vein laterally and backward. It had extended upward as far as the base of the skull and downward to the epiglottis and upper portion of the esophagus; it was firmly adherent posteriorly to the prevertebral fascia. Medially it encroached upon the pharynx. The mass was freed posteriorly and enucleated from the surrounding structures. The histologic diagnosis was lipoma. There has been no evidence of metastasis or recurrence.

The second case was that of a 36 year old public official who noted a small swelling behind the left angle of the mandible. Seven years later it had reached the size of a hen's egg. This was only partially removed because of adhesions. Upon admission to the authors' service the patient was complaining of dysphonia and nasalization of the voice.

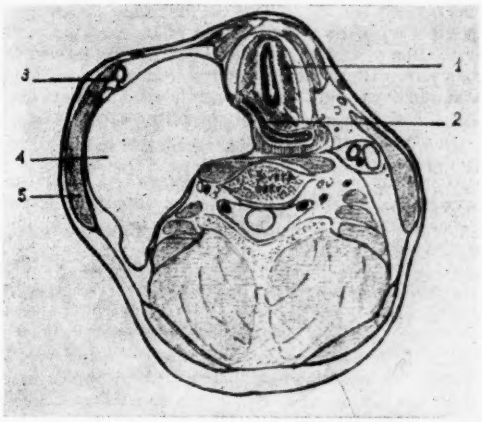

FIG. 1 (Margottini, Ficari). Transverse section of the neck at the level of the fifth cervical vertebra; relation of the tumor (4) to the larynx (1), the pharynx (2), the vasculonervous bundle (3), and sternocleidomastoid muscle (5).

At operation the neoplasm was found to have displaced the common carotid artery and the vagus nerve anteriorly and was adherent to them, to the internal jugular vein, and to the prevertebral fascia. The tumor was removed along with the internal jugular vein, the sternocleidomastoid muscle, and the lateral cervical lymph glands. The histological diagnosis was neurilemmoma; two of the lymph nodes evidenced a simple hyperplasia. Up to the present time there has been no evidence of either metastasis or recurrence.

The third case was that of a 24 year old housewife who had noted 8 years previously a swelling in the right lateral cervical region. It had gradually increased in size. The tumor was firmly elastic, movable, and painless to pressure.

At operation an encapsulated tumor, the size of a turkey egg, was found under the upper portion of the sternocleidomastoid muscle, it displaced the vagus nerve and carotid artery medially and anteriorly. It was removed en bloc together with the sternocleidomastoid muscle and the internal jugular vein. The histologic diagnosis was neurilemmoma. There has been no evidence of metastasis or of recurrence.

The fourth case was that of a 46 year old saddler who, 13 years previously, had suffered a febrile attack with symptoms suggesting parkinsonism. Three months previously the patient began to suffer from dysphagia and dysphonia which progressed.

Endoscopy showed the isthmus faucium pushed to the right and downward and reduced to a mere slit by a large swelling, the size of an orange, on the left side at the level of the soft palate. The tonsil on this side appeared to be somewhat larger than normal with evident crypts and intense congestion of the covering mucosa.

Operation disclosed a soft elastic swelling protrud-

ing beneath the left angle of the mandible, in intimate contact with the posterior wall of the pharynx and extending across the midline. The structure proved to be cystic with chocolate-colored, mucoid content. It was removed and its base coagulated. Histologically the tumor was a mixed tumor of the salivary type. Five years later there was no sign of recurrence or metastases.

The fifth case was that of a 41 year old housewife who began, 3 months previously, to suffer from headaches, dizziness, and ringing in the left ear; finally dysphagia developed.

At operation a swelling in the midline of the pharynx was exposed by a vertical incision. It was caused by an encapsulated cystic mass which could be removed intact. Histologic examination of the removed specimen did not reveal the nature and origin of the cyst. —*John W. Brennan, M.D.*

NECK

Scalene Node Biopsy; Implications in Abdominal and Thoracic Disease. Fawzi A. Pualwan, Charles D. Sherman, Jr., George L. Emerson, James A. De Weese, and Others. *Cancer*, 1958, 11: 4.

The primary purpose of this report is to broaden the indications for scalene node biopsy. Secondary purposes are to consider the implications of a long term study and to emphasize the use of such biopsy as a criterion of inoperability in instances of cancer which spreads by the lymphatic system.

A study of 100 patients who have undergone 102 scalene node biopsies forms the basis for the paper. A brief description of the technique is given. Two technical factors are believed to help explain the variance in positive scalene node biopsies reported by different workers. One of these was the failure to examine the tissue when it appeared normal grossly. Failure to remove the node-bearing tissue within 1 cm. of the jugular-subclavian junction was the second factor.

There were 4 positive scalene node biopsies in 20 patients who had proved or probable cancer within the abdomen. Two of these patients had carcinoma of the stomach and 2 had carcinoma of the pancreas. Biopsy was negative in 7 other patients, all later shown to have benign disease. Of 34 patients with proved intrathoracic cancer 15 had positive biopsies. Of 12 patients with probable malignant thoracic tumors 11 had negative biopsies. There were 5 positive biopsies in a group of 24 proved benign and 4 probably benign cases. The percentage of positive biopsies in the nonthoracic malignant group was 22.2 per cent, in the malignant thoracic cases 34.9 per cent, and in the benign intrathoracic group 20 per cent.

Complications were infrequent. A chylous fistula and chylothorax developed in 1 patient and 6 patients had slight fluid collections in their wounds.

It is believed that positive scalene node biopsies may be used as criteria of inoperability, which may be especially helpful in cancer of the stomach and pancreas. It is also useful in determining inoperability in intrathoracic carcinoma. A negative biopsy does not rule out the possibility of disease and should not influence the clinical management of the patient. Further investigations and studies on the question of scalene node biopsy are planned by the authors.

—*Donald C. Geist, M.D.*

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Head Injuries in Childhood. PHILLIP HARRIS. *Arch. Dis. Childh.*, Lond., 1957, 32: 488.

THE AUTHOR reports 150 consecutive head injuries in children observed at the Royal Infirmary, Edinburgh, over a 5 year period ending in 1954. The age range extended to 16 years. Acceleration injuries, including penetrating injuries and deceleration injuries, accounted for the vast majority; a small group of crush injuries occurred. There were 87 skull fractures of which 52 were depressed and compound. Basal fractures of the skull were uncommon. The large number of compound fractures in these children was in contrast to an adult group of 450 patients passing through the center during the same years in whom the incidence was only 12 per cent.

Intracranial hematomas occurred in the form of extradural hematomas in 7 per cent, subdural hematomas in 4 per cent, and intracerebral hematomas in 6 per cent. The various features of the childhood injuries were compared with the adult groups and slight differences in the clinical aspects accompanying the hematomas were noted. Among the 11 patients with extradural hematomas, the history was briefer than is usually found in adults, and there was often no initial period of unconsciousness. Irritability, restlessness, epilepsy, vomiting, fever, a bulging fontanel, retinal hemorrhages, and drowsiness were features of the subdural hematoma group in childhood. The subdural hematomas occurred more often bilaterally in children than in adults. Roentgenograms of the skull were important to demonstrate the depressed fracture or the presence of foreign bodies but otherwise were of limited value. (An example of local enlargement and thinning of the skull due to a chronic subdural hematoma was illustrated.) Lumbar puncture was found of limited value and was considered probably dangerous, and the electroencephalograph was found to be of little help in this group.

There were 15 deaths, including 4 in association with an extradural hematoma. The cause was severe primary or early secondary brain-stem damage.

Among the sequelae, there were 39 children who had epilepsy, 20 with persistent psychological alterations, 12 with speech defects, and 27 with other neurological abnormalities. The author notes that if the injury occurred before 2 years of age and involved the left hemisphere, certain of the patients became left-handed and developed speech normally. The standard methods of treatment used are summarized with a note relating to prevention of accidents, in particular of children playing in the streets.

—W. Eugene Stern, M.D.

Hemangioma of the Cerebellum (Das Kleinhirnhaemangiom). H. KRAYENBÜHL and G. YASARGIL. *Schweiz. med. Wschr.*, 1958, 88: 99.

THE AUTHORS, of the Department of Neurosurgery of the University of Zurich, Switzerland, discuss the symptomatology, differential diagnosis, and prognosis of hemangioblastoma of the cerebellum. They tabulate in detail a series of 45 cases of their own observation and review briefly the literature, especially with respect to heredity and combination with other malformations, such as hemangioma of the retina, liver cavernoma, and cysts of the liver and pancreas.

Altogether 508 tumors of the cerebellum were observed in the authors' department. Of these, 45 were verified as hemangiomas. Two of the patients died before the operation; one after ventriculography, the other after suboccipital puncture. Of the 43 cases in which surgery was performed complete extirpation was impossible in 7 because of the site of the tumor, and only partial removal and decompression could be done. In 36 cases the hemangioma was removed completely with 4 postoperative fatalities. Four of the survivors are invalids, 2 of them due to blindness, the remaining 28 are well and able to work.

Multiple angiomas and recurrences after extirpation are not infrequent. One of the authors' patients was operated on three times within 14 years and expired after the third intervention. At autopsy multiple angiomas in other portions of the brain were found. Another patient had a recurrence of a cystic angioma in the cerebellum 18 years after the first operation. *—Werner M. Solmitz, M.D.*

Subdural Hygroma. J. BRYANT CURTIS. *Med. J. Australia*, 1958, 1: 69.

THE AUTHOR considers a group of cases of subdural collection of clear, colorless or yellow fluid, usually following trauma. The series was divided into 3 groups: 2 adult groups, acute and chronic conditions, and 1 infantile group.

In the adult group with acute conditions, 6 patients had severe brain injury and were comatose upon admission to hospital. Operation in the form of exploratory burr holes was carried out between 24 hours and the fifth day after injury. Subdural fluid, clear and under pressure, was found in every case. Sometimes the fluid was described as clear, at other times xanthochromic, and at still other times blood-stained. One patient survived. The subdural collections were associated with severe brain injury or some other complication such as fat embolus. Operation was carried out because of indications of progressive deterioration in the level of consciousness. The preoperative diagnosis entertained was that of intracranial hemorrhage causing compression.

The group of adults with chronic conditions consisted of 7 patients. Operation was carried out from 18 to 35 days after the injury. Mental symptoms were very prominent in the group, several approximating Korsakov's syndrome. The cerebrospinal fluid, when examined, was normal in this group, and in one patient, in which the subdural fluid was analyzed, the protein content was 200 mgm. per cent on the right side, and 2,000 mgm. per cent on the left side. The

author believes that the explanation for the character of the fluid is a mixed one—when the fluid is clear and collects early it is probably cerebrospinal fluid which has escaped through a traumatic opening in the arachnoid; if it collects late it is probably a mixture of blood and cerebrospinal fluid which has caused subsequent effusion by breakdown.

In the subacute or chronic group the outstanding features were persistence of stupor and confusion, or, if the level of consciousness improved, the appearance of psychosis. Focal neurological abnormalities were not prominent.

The author emphasizes the need to depress the brain away from the dura at the time of operation so that the clear, subdural fluid can readily flow away. Unless the fluid collection is massive or occurs directly at the site of the dural opening, it may be easily missed.

There were 7 patients of the infant group. These cases are those in which subdural hematomas were suspected after birth, injury, or infection. If the case was traumatic, fluid appeared from a tear in the arachnoid, but in the nontraumatic and infectious cases the fluid appeared as an effusion into the subdural space. In none of the babies operated upon was a membrane found. Subdural aspiration or burr hole exploration was the method of treatment. Six patients survived in the infantile group; all have recovered well. —*W. Eugene Stern, M.D.*

Cystic Degeneration in Glioblastoma Multiforme: Trapped-Air Sign. GWILYM S. LODWICK. *Radiology*, 1958, 70: 74.

A REVIEW of the roentgenograms of 500 cases of primary tumor of the brain and spinal cord from the Armed Forces Institute of Pathology yielded three instances of multiple radiolucencies, interpreted as bubbles of gas within the brain substance, observed following ventriculography. The histologic diagnosis in each of these cases proved to be glioblastoma multiforme. The author has subsequently observed this sign in three additional cases. The presence of gas bubbles within the tumor's substance is explained by the necrotic, fluid-filled cysts becoming intercommunicative, thus during ventriculography the needle would permit displacement of fluid from the cyst and replacement of fluid by the gas from the ventricles. The cysts, of course, would only be demonstrated if they lay in the path of the ventricular needle.

The author lists the radiologic differential diagnosis of lesions which can trap air during ventriculography: slow-growing gliomas, hemangioblastomas, intracranial epidermoids, and cystic teratoid tumors, inflammatory lesions, in particular, brain abscess, and a miscellaneous group including porencephalic cysts, leptomeningeal cysts, cysts of cavum septi pellucidi, hydatid cysts, and colloid cysts.

—*W. Eugene Stern, M.D.*

Meningiomas of the Posterior Cranial Fossa. THEODORE A. TRISTAN and PHILIP J. HODES. *Radiology*, 1958, 70: 1.

GLIOMAS are the most common tumors found in the posterior fossa, with acoustic neurinomas the second in frequency. Meningiomas are fairly common and occupy third place, and this is especially significant because meningioma of the posterior fossa is notoriously difficult to diagnose. Not only does it present a great variety of symptoms, there being no "typical picture," but it may also easily be confused with such lesions as syringomyelia, amyotrophic lateral sclerosis, myelodysplasia, and multiple sclerosis. The authors quote Castellano and Ruggiero to emphasize the fact that "the possibility of a meningioma of the posterior fossa should always be considered in the presence of a capricious clinical history with long remissions and 'illogicalness'." Headache, stiff neck, and subtle changes in the lower cranial nerves are, however, fairly constant signs of this tumor.

Meningiomas of the posterior fossa arise in the following sites: (1) cerebellar convexity; (2) tentorium cerebelli; (3) posterior surface of the petrous portion of the temporal bone (meningiomas of the cerebellopontine angle); (4) clivus; and (5) foramen magnum. Bone changes may be absent on plain roentgenograms; arteriography is frequently helpful in outlining the tumor site; ventriculography may be of some aid, but is not without real danger; air injection by the lumbar route should never be done when a meningioma of any other space occupying lesion of the posterior fossa is suspected. Fortunately many of these tumors are completely removable, but when such removal is not possible, suboccipital decompression may give the patient relief for a long period of time.

—*John Martin, M.D.*

SPINAL CORD AND ITS COVERINGS

Intrathecal Phenol for Intractable Pain; Safety and Dangers of the Method. P. W. NATHAN and T. G. SCOTT. *Lancet*, Lond., 1958, 1: 76.

IN VIEW OF the importance of the possibility of a chemical substance that would relieve pain by primarily attacking the sensory nerve fibers, the authors have studied the effect of phenol in a lipid solution as reported by Maher (*Lancet*, Lond., 1955 and 1957).

Two solutions were used and tested. One was phenol dissolved in glycerin and ethyl iodophenylundecylate (myodil), and the other was a solution of silver nitrate in phenol and glycerin. The phenol in myodil was in a 7.5 per cent solution in most cases, and only about 1 c.c. was injected intrathecally. In the use of silver nitrate, 0.81 ml. was first dissolved in a small amount of water and was then added to the phenol in glycerin solution. The exact quantities are not specifically mentioned.

Since these solutions are heavier than the spinal fluid the injection is made intrathecally at the desired level with the patient lying on the affected side. The maximal effect takes place within a few minutes, but the patient must lie on his side for a period of 10 to 15 minutes after which he can be placed in a sitting position.

Although this article is not presented as a clinical report on the value of this therapy, but primarily on the toxic effects and the rate of chemical diffusion of the phenol from the myodil into the cerebrospinal fluid, it is stated that the authors' tests resulted in relief from pain in about half of the patients. Thirty injections of phenol in myodil were used and in no case was there evidence of paresis, morbidity, or

mortality. In only one case was there a retention of urine and diminution of sensation in the saddle area. However, there had been some slight disorder in defecation before the injection because of infiltration of cancer tissue about the pudendal nerve. The spinal fluid was studied in 9 patients at intervals after the injection, but there was only a slight increase in white cells and protein—the highest being 73 cells in one patient and 140 mgm. of protein in another. Seven of these patients eventually died from cancer, and at postmortem examination there was no gross pathologic abnormality. Further histologic studies are being carried out.

Silver nitrate in phenol in glycerin was used in 13 patients and 6 of them had a slight increase in weakness of an already affected limb. One patient had the solution injected in the cervical area with a resultant chemical meningitis and death. Examination of the spinal fluid in 5 patients, however, revealed a much higher protein content than with the group treated only with phenol in myodil.

The rate of diffusion of the phenol was studied in both in-vivo and in-vitro experiments. In the latter there is a continued rise in diffusion during the first 24 hours, but this was not found to occur in-vivo. It is reasoned that this is due to the fact that in the in-vivo experiments the tissues may take up some of the phenol, and also it is more rapidly dispersed.

In essence it is shown that 1 c.c. of a 7.5 solution of phenol in myodil can be injected intrathecally safely without any physical evidence of toxicity.

—Jack I. Woolf, M.D.

Ependymoma of the Cauda Equina; a Report of the Clinicopathologic Aspects and Follow-Up Studies of 18 Cases. William W. Ayres. *Mil. Med.*, 1958, 122: 10.

Ependymoma of the cauda equina, conus medullaris, or filum terminale is not particularly common (including these 18, approximately 107 cases are reported in the literature), and accurate diagnosis of the tumor often proves difficult. Clinically it must be differentiated from herniated intervertebral disc, genitourinary tract disease, sacroiliac sprain, sciatica, progressive neuropathic atrophy, and even brain tumor. The author classifies the tumor into three histologically separate types: epithelial (7 cases); myxopapillary (6 cases); and cellular (5 cases). He points out that because of this rather wide spread of microscopic appearance the tumor may be mistaken for such lesions as angiomatous meningioma, glomus tumor, protoplasmic astrocytoma, and hemangioblastoma.

The clinical symptoms cover a wide range, yet are what would be expected of a subdural, extramedullary expanding lesion, directly compressing and irritating the spinal nerves, and causing a blockage of the cerebrospinal fluid. Low back pain, radiating segmental root pain, sensory loss and paresthesias, motor weakness, reflex changes (usually of the flaccid type), constipation, sphincter dysfunction, and cerebrospinal fluid with a high protein content are all common findings. Myelography is particularly helpful in locating the exact level of the lesion, since the erratic shape and size of some of these tumors may make anatomic localization difficult by neurologic examination alone.

The treatment is definitely surgical removal, and the earlier the better, since the more severe neurological changes are prone not to clear up entirely even with the complete removal of the simpler, encapsulated epithelial type. The softer, more spreading, and less easily removed myxopapillary and cellular ependymomas are sensitive to x-ray and the patient usually is relieved temporarily by roentgen therapy. Recurrence is the rule, however, so that, essentially, any treatment of these two types of tumor is only palliative.

This article is particularly useful in the clear descriptions which it gives of the histologic natures of these tumors, and there is a good bibliography with it.

—John Martin, M.D.

PERIPHERAL NERVES

The Clinical Significance and Pathogenesis of Anomalies of the Cauda Equina (Zur klinischen Bedeutung und Pathogenese von Caudaanomalien). H. W. Pia, W. Haag, and F. W. Spaar. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1958, 286: 431.

In 1955 a new anomaly of the cauda equina was reported from the authors' service. Seven similar cases have now been recorded.

These have been divided into 2 groups. In the first group (cases 1 to 5) there were 4 males and 1 female. All were in the fourth or the fifth decade of life. Common to all were recurrent attacks of a monoradicular syndrome. The first 2 were operated upon for prolapse of the disc; in one no prolapse was present. In 3 patients a tentative diagnosis of radicular neuritis was assumed. The lumbagolike pains were related to physical exertion. In one of the 5 recurrent attacks of paresis of the peroneal muscles occurred; in 4 motor disturbances were slight and affected only a part of the area of distribution of the caudal roots.

In the second group were 2 women in the third decade of life. Both complained of persistent bilateral root pains and weakness in both legs.

Myelographic examination, with air and abrodil was carried out in 5 patients. The most characteristic and frequent finding was a high termination of the sac of the cauda equina; in only one instance was there partial visualization of the midroots of the cauda. It is concluded that myelography can demonstrate the anomaly.

In 2 of the first group the caudal root was thickened, sclerotic, and obliterated. These roots were apparently functionless. In both the involved root was resected and subjected to histologic study which disclosed exuberant growth of the connective tissue of the dura, the perinurium, and the endonurium. This surrounded, invaded, and compressed the nerve root itself and resulted in breakdown of the myelin sheaths and increase of the cells of Schwann. No motor or sensory disturbances resulting from these resections were noted.

The authors believe the sclerotic changes resulted from chronic irritative and circulatory disturbances. Laminectomy, with root resection in the two cases, resulted in the relief of symptoms.

—John W. Brennan, M.D.

Use of Radioactive Colloidal Chromic Phosphate for Prevention of Amputation Neuroma. JOHN I. PERL and DAVID G. WHITLOCK. *J. Internat. Coll. Surgeons*, 1958, 29: 77.

THE AUTHORS have studied several new substances which might prevent formation of a neuroma on the proximal stump after severance of peripheral nerves. This experiment was carried out on 3 or 4 month old rats. Both sciatic nerves were severed and ligated with plain cotton. In each case one side was treated and the opposite nerve was used as the control.

The following methods were used: (1) cauterization with crystalline silver nitrate, (2) injection of 0.1 c.c. of 50 per cent aqueous procaine hydrochloride, (3) injection of 0.1 c.c. of 1 per cent maleic hydrazide, (4) injection of 0.1 c.c. of undiluted undecylenic acid, and (5) using cotton thread impregnated with radioactive chromic phosphate. The first four substances tried were found to be relatively ineffective although in some cases there was a degree of suppression of formation of the neuroma. The use of radioactive chromic phosphate in the ligature material, however, prevented nerve regeneration to a high variable degree in 88 per cent of the stumps treated. The higher radiation dosage that was used resulted in greater inhibition of nerve regeneration. It is not known whether the lack of axonal growth is primarily from the radiation or indirectly from suppression of growth of the Schwann cells or fibroblasts.

In 16 clinical cases 25 to 250 microcuries of radioactive colloidal chromic phosphate were injected, and although a painful phantom syndrome did not develop, it is realized that this series is too small to fully evaluate this procedure.—*Jack I. Woolf, M.D.*

SYMPATHETIC NERVES

A Comparison of Thoracolumbar Sympathectomy and Adrenalectomy with Adson Sympathectomy in the Treatment of Severe Arterial Hypertension. W. S. BLAKEMORE, H. A. ZINTEL, W. A. JEFFERS, A. M. SELLERS, and Others. *Surgery*, 1958, 43: 102.

A SERIES of 230 patients with severe essential hypertension were followed up for a period of 3 to 7 years after two types of operative procedure. One hundred sixteen patients had a 90 to 100 per cent adrenalectomy, with sympathectomy consisting of removal of the twelfth thoracic through the second or third lumbar ganglia, with intervening trunk, and the subdiaphragmatic portion of the splanchnic nerves. One hundred fourteen patients had only the more extensive thoracolumbar sympathectomy consisting of removal of the ganglia and trunk of the sixth thoracic through the third lumbar ganglia, inclusive, together with the splanchnic nerves. In no operation was the celiac ganglion resected; all patients were operated upon bilaterally in two separate operations.

All patients with adrenalectomy, even subtotal, have had to have postoperative exogenous hormone therapy, but this has not been found to be a difficult matter so far as patient cooperation is concerned. Skin pigmentation was apparent in 30 per cent of the adrenalectomized patients. The operative mortality and survival rates were not as good among the adrenalectomized patients as among those with sympathectomy alone, but this may be because they were the more severely ill in the beginning. According to the statistics presented the results of the operations upon blood pressure levels, electrocardiogram, heart size, and ocular fundal changes show superior results following some degree of adrenalectomy combined with sympathectomy. Angina and congestive heart failure, particularly, were relieved in the adrenalectomized patients, and both operative procedures relieved headache.

It is emphasized that in spite of the current interest in new forms of medical management of hypertension, surgery definitely has a proper place in hypertension therapy, and that the most important matter is being able to determine what patients should be selected for surgery, and which should not be subjected to its disappointments and dangers. The authors select their patients more or less upon the basis of the following criteria: (1) severe disease as measured by diastolic pressures of 120 mm. Hg or more; (2) evidence of progressive vascular damage to the brain, heart, eyes, or kidney; (3) failure to respond to vigorous medical therapy; (4) age not more than 55 years; and (5) no vascular accident to brain or heart within the past 6 months. Any patient with severe renal damage definitely is not considered for surgery.

—*John Martin, M.D.*

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Exfoliative Cytology of the Human Mammary Gland and Its Value in the Diagnosis of Cancer and Other Diseases of the Breast. GEORGE N. PAPANICOLAOU, DORIS G. HOLMQUIST, GENEVIEVE M. BADER, and EMIL A. FALK. *Cancer*, 1958, 11: 377.

THE SENIOR AUTHOR and his colleagues present a most extensive study and atlas of photomicrographs of exfoliative cytology of the breast and describe its significance in the diagnosis of both benign and malignant breast disease. This research project was first undertaken in 1950 and has continued ever since with the following objectives in view:

1. To investigate the normal, atypical, and malignant exfoliative cytology of the breast.
2. To determine the diagnostic value of the microscopic examination of nipple secretion in patients with and without breast disease.
3. To evaluate the usefulness of smears in the diagnosis of breast cancer.
4. To determine the proportion of asymptomatic women from whom breast secretion could be obtained.
5. To study the cytology of breast cyst aspirates.

Breast secretion smears were obtained from 1,066 of 2,010 patients examined for nipple discharge. Cyst aspirate smears were obtained from 100 patients. Of the total of 2,010 patients, 917 were without symptoms of breast disease. By means of palpation or a hand breast pump, secretion was obtained from 18.5 per cent of these 917 patients who were asymptomatic with regard to their breasts. From this study it would appear that in the normal gland there is a very small amount of epithelial desquamation.

The cytological patterns in breast secretion smears in benign breast disease are carefully discussed as are the cell structures of aspirates from benign and malignant cysts.

There were 45 patients with proved primary breast cancer in a group of 510 patients with symptoms of breast disease. The breast secretion was suspicious or positive in 60 per cent of this group. Malignant cells could be differentiated from nonmalignant cells in breast secretion on the basis of nuclear and cytologic criteria of cancer. The percentage of false negatives, however, appeared to be rather high in this study.

Despite its limitations, the examination of breast secretion smears should have a definite place among the methods for differential diagnosis of breast disease and the early detection of breast cancer. The usefulness of this application at present is greatest in those cases in which there is a spontaneous discharge from the nipple. The diagnostic value of breast secretion and cyst aspirate smears is sufficient to routinely incorporate this test into the physical examination. Although negative reports cannot be relied upon to rule out breast cancer, the positive reports are as reliable as in any other application of the cytologic smear technique. —*Edward F. Lewison, M.D.*

Cohort Fertility and Increasing Breast Cancer Incidence. BRIAN MACMAHON. *Cancer*, 1958, 11: 250.

MANY STUDIES have indicated that the risk of breast cancer is closely related to fertility. The mortality rate is highest for unmarried women, it is next highest for married nulliparous women, and it is lowest for married women who have borne children. The author analyzes the data from the Registrar General for England and Wales and from the vital statistics of the United States and from the reports of the United States Bureau of Census with regard to the increasing breast cancer mortality rate during the past several decades. Despite the increasing breast cancer mortality rate, the author finds that there has been an increasing fertility during this time. Since breast cancer risk is inversely related to fertility, it is apparent that fertility changes do not explain the observed changes in the breast cancer mortality rates. These observations are discussed in the light of other variables such as trends in lactation experience which may also influence breast cancer rates. —*Edward F. Lewison, M.D.*

Paranasal Transethmoidosphenoidal Hypophysectomy in Metastatic Mammary Carcinoma (Die paranasale transethmoido-sphenoidale Hypophysektomie beim metastasierenden Mammakarzinom). F. ESCHER, F. ROTH, and H. COTTIER. *Schweiz. med. Wschr.*, 1958, 88: 49.

HORMONAL THERAPY of mammary cancer is indicated in metastatic, in inoperable primary, and in recurrent tumors. Hypophysectomy can be accomplished by chemical means, such as cortisone therapy, ionizing radiation therapy, and surgical extirpation. Implantation of radioactive material into the sella does not totally eliminate the pituitary function; direct irradiation causes too many side effects and cortisone therapy is self-limiting.

The neurosurgical method of hypophysectomy through a right transfrontal approach was developed by Luft, Olivecrona, Pearson, and Ray. Rhinological operations for removal of the pituitary gland through the septum and maxillary antrum were practiced at the start of this century. The operation which presents the best exposure is the paranasal transethmoidosphenoidal procedure as developed by Chiari in 1911.

Through a paranasal incision the lateral nasal wall is resected and an ethmoidectomy performed. The posterior septum is removed and the sphenoidal sinus opened. The anterior and distal walls of the sella are thinned out and subsequently resected. After incision of the dura the pituitary gland is mobilized and removed. This operative procedure was well tolerated by 26 cancer patients, even though most of them were in a cachetic state; the operative complications were minor in nature. Hemostasis presented some difficulty in a few patients, bleeding from the cavernous sinus being the offender. An occasional blood pressure drop observed immediately after hypophysectomy is of a reflex nature. Cerebral spinal fluid leakage up to 4 weeks' duration was observed in 7 cases despite such

operative precautionary measures as galeal reinforcement of the dural rent. The healing of the sella is accomplished by means of a firm fibrous plate and new bone formation. Meningismus occurred in 4 cases, but always could be controlled with antibiotics. No operative or postoperative mortality was registered, which compares favorably with Pearson and Olivecrona's procedure, fatal in 5 to 10 per cent. No instances of brain edema or optic nerve damage were noted.

The patients selected for hypophysectomy had lymph node, cutaneous, and bone metastases; carcinomatous lymphangitis of the lung; and carcinomatous pleuritis with local recurrences. Although definite preoperative knowledge of hormonal dependence of the individual tumor would be desirable, the only available criterion is empirical. Tumors responding to castration and androgen therapy will, in general, respond satisfactorily to hypophysectomy. Extensive liver, brain, and pulmonary metastases with respiratory insufficiency contraindicate operation. Of 9 cases autopsied in which there had been no remissions or only one of short duration, only 8 had liver metastases. Metastases in the pituitary gland are not rare. In one case reported, myxedema and diabetes insipidus were associated with involvement of the posterior pituitary gland. One year later this preoperatively bedridden patient lives in remission and takes care of her household.

Preoperative hormonal evaluation is of importance for the postoperative follow-up. Serum electrolytes, urine, 17-ketosteroids, the basal metabolism rate, the protein-bound iodine, cholesterol determinations, calcium balance, and pulmonary function studies are indicated in the appropriate cases.

Total hypophysectomy was accomplished in 11 of 26 patients. It was of interest to observe good clinical response even in cases of incomplete hypophysectomy. After total removal of the pituitary gland gonadotropin disappears in 2 to 3 weeks. Absence of the menses, atrophy of the vaginal mucosa, protein-bound iodine of less than 3.5 gamma per cent, and a negative basal metabolism rate are other results. The 17-ketosteroid excretion of less than 2 mgm. per 24 hours expresses adrenal suppression, but the clinical signs of insufficiency develop less rapidly than after adrenalectomy. The adrenal glands continue to secrete aldosterone, and no electrolyte deficiency is therefore noted. The carbohydrate metabolism does not seem to be affected after hypophysectomy; the fasting blood sugar was found to be normal or subnormal, and the increased sensitivity to insulin was perhaps caused by elimination of the growth hormone.

Polyuria produced by removal of the posterior pituitary lobe is only temporary, of 8 to 10 days' duration, because the antidiuretic hormone is produced in the supraoptic and paraventricular nuclei, both of which are left intact after transsphenoidal hypophysectomy.

For substitution therapy from 12.5 to 25 mgm. of cortisone and from 50 to 100 mgm. of desiccated thyroid are an adequate daily maintenance dose. It is necessary to increase the dose of cortisone in case of intercurrent disease.

Patients who either showed regression or stationary behavior of the metastases were considered to be in remission. The duration of subjective remission on occasion lasted while new metastases or progression of the metastases occurred. Two-thirds of the hypophysectomized patients had remissions; even after the exclusion of short (4 to 5 months) remissions, half of the total number of patients had remissions of longer duration. No relationship of the remission to age was found, and good results were obtained even in menopausal patients. The immediate relief of bone pain in cases of bone metastases, which sometimes occurs shortly after recovery from anesthesia, may be dramatic. Further remission after hypophysectomy was observed even in patients with previous remissions from ovariectomy, adrenalectomy, or androgen and cortisone therapy. Hypophysectomy is superior to all other therapeutic methods for patients with far advanced breast carcinoma.

—*Karel B. Absolon, M.D.*

Reticulum Cell Sarcoma of the Breast; Clinical and Pathologic Study (Reticolosarcoma della mammella: studio clinico ed anatomopatologico). SAVERIO LATTERI, JR. and ANTONINO SANTORO. *Gior. ital. chir.*, 1957, 13: 1025.

OF ALL BREAST LESIONS, sarcomas are the most rare. Reticulum cell sarcomas are particularly unusual in this location. These lesions may develop in a previously benign adenoma or form de novo. They are rare in the male, only 3 cases having been reported in males. The most frequent location is the upper outer quadrant where the sarcoma forms a round mass that is seemingly benign on palpation. Growth is extremely rapid.

Microscopically, reticulum cell sarcoma of the breast consists of sheets of round cells with fine protoplasmic bridges connecting with a network of reticular fibers. Multinucleated giant cells are seen frequently. The reticular fibers of the stroma take silver stains. In some of these tumors one may find fibrosarcomatous or rhabdosarcomatous areas which show that the tumors are made up of cells which have the potential of differentiating into other mesenchymal tissues. Their spread is both lymphogenous and hematogenous. They are prone to recur locally after amputation of the breast. Pulmonary and visceral metastases are frequent.

In view of their marked radiosensitivity, the author considers that the preferred method of treatment is radical amputation of the breast followed by roentgen therapy.

—*René B. Menguy, M.D.*

Breast Plastic Surgery: Reduction Mammaplasty, Mastopexy, Augmentation Mammaplasty, and Mammary Construction. HERBERT CONWAY and JAMES SMITH. *Plastic & Reconstr. Surg.*, 1958, 21: 8.

THE AUTHORS review 245 cases in which plastic procedures have been performed upon the female breast. The operative procedures employed included the following: (a) reduction mammaplasty by partial amputation of the breast, construction of a suitable mammary eminence and free transplantation of a composite graft consisting of nipple, areola, erectile tissue, and mammary ducts, (b) reduction mammaplasty by the several techniques of the transposition operation, (c)

mastopexy for the ptotic breast, (d) augmentation mammaplasty by use of free grafts of dermis and fat, (e) augmentation mammaplasty by insertion of inert material (ivalon sponge), (f) construction of the breast with a pedicle of mammary tissue from the opposite breast, (g) reconstruction of the breast for deformity secondary to burns or other trauma, and (h) miscellaneous secondary mammaplasty procedures for unsuccessful primary breast plastic surgery.

There were 159 cases of macromastia. Of the patients, 11 were in the second decade of life, 43 in the third decade, 51 in the fourth decade, 40 in the fifth decade, and 14 in the sixth decade. The indications for operation were as follows: bilateral macromastia, bilateral macromastia with cystic fibrosis, with ptosis, with hypertrophy, and with asymmetry, unilateral macromastia, gigantomastia, and unilateral macromastia with virginal hypertrophy. In 135 of the 159 cases the operation employed was partial amputation of the breast with construction of a mammary eminence and transplantation of the nipple as a free composite graft consisting of skin, erectile tissue, and mammary ducts. Twenty-two minor complications in these cases included the following: hypertrophic scars, hematoma, crusting of the central part of the nipples with scarring, wound abscess, wound infection requiring drainage and subsequent secondary closure, and minor disruption of the suture line requiring secondary closure. There were no examples of severe slough of the mammary tissue or cutaneous covering, and no instances in which the free composite nipple grafts failed. The amount of tissue removed from the breast was decided upon only after obtaining the weight of the breast with the patient in a standing position. In 7 cases secondary revision was necessary, in 2 cases because of asymmetry of the breasts, and in 5 cases because of hypertrophic scars; 97.7 per cent of the patients expressed themselves as pleased with the outcome of the surgery.

Twenty-four of the 159 patients were operated upon by the technique of Biesenberger or of Ragnall—reduction mammaplasty with transposition of the mammary gland. There were 6 major complications. These included extensive slough of the skin flaps in 2 cases, small slough of the skin flaps in 2 cases, abscess in one case, and gangrene of the mammary tissue requiring mastectomy in one case. Thus, in 6, or 25 per cent of the cases, there were tragically poor results, and in 10 cases, or 41.6 per cent, the patients were dissatisfied with the results of the surgery.

There were 35 cases in which mastopexy was done for varying degrees of ptosis. In 31 of the 35 cases it was carried out by a transposition technique. This consisted of the elevation of a flap of skin and fat on the anterior upper portion of the breast, denudation of the breast by resection of an elliptical section of skin, with care to leave the areola and the nipple attached to the underlying mammary tissue, suture of the upper portions of the mammary gland to the intercostal musculature of the second and third interspaces, delivery of the nipple through a suitably placed circular excision of skin and fat in the upper flap, and the closure of the wound in a curvilinear line in the dependent portion of the breast. In these 35 cases operated upon for ptosis there were 5 complications of some significance: partial loss of both upper flaps, partial loss of one upper flap, partial slough of the areola, hematoma, and hypertrophic scars, respectively. None of the complications proved to be important ultimately, and all of the patients expressed themselves as satisfied with the results of surgery.

Thirty patients were operated upon for micromastia. In 22 of these the clinical diagnosis was postpubertal micromastia, in 2 it was unilateral micromastia, in 3 it was bilateral micromastia secondary to reduction mammaplasty performed elsewhere, and in 2 cases unilateral micromastia secondary to reduction mammaplasty performed elsewhere. In 1 case the unilateral micromastia was secondary to excision of the tumor. In 3 of the 30 cases of micromastia free fat grafts were used in attempted correction of unilateral micromastia. All of these grafts liquefied and the operative procedure was ineffectual. This technique has been abandoned. In 15 of the 30 cases of micromastia dermal fat grafts were used. Ten of the patients had bilateral micromastia, 1 had unilateral micromastia, and 4 had postoperative micromastia secondary to reduction mammaplasty. The weights of these grafts, obtained from the gluteal areas, varied from 80 to 250 grams (each side). The complications were as follows: breast abscess in 2 cases, hematoma 1 case, wound infection 2 cases, slight drainage in 1 case, and aseptic absorption of grafts in 3 cases. Of the 15 patients treated by this technique, 6 had complications of some significance. The surgery was successful in 8, or 53.3 per cent.

Experience with the use of ivalon sponge was limited to 24 operations on the breast in 12 patients. All of the breasts were examples of significant micromastia. The operations were accomplished without complications except that hypertrophy of the scars developed in 1 patient. Good results were obtained in this group of patients and with a single exception the patients were pleased with the result of the operation. This was the case of a housewife who complained of abnormal hardness of the breast. Experience with these cases has led to the feeling that this type of prosthetic material is well tolerated in the mammary region and that the objectionable hardness can be diminished by adequate dissection of the cavity into which the prosthesis is inserted. Disappointment was experienced at the finding in follow-up that the prostheses lost approximately 25 per cent of their volumes, presumably because of fibrotic contracture of the prosthetic material.

Because of the report of Oppenheimer and Oppenheimer, that the material is carcinogenic, animal experimentation was started on a group of mice 3 years ago. Ivalon was buried in the mammary region, but the results were inconclusive because so many of these animals died from intercurrent diseases. The 6 which did survive for 2 years were subjected to autopsy and no evidence of tumor was found in their mammary glands. In view of the experimental data and the fact that accurate late clinical results have not yet been reported in a sufficiently large group of cases, the correction of micromastia by the implantation of foreign materials such as mentioned above must be looked upon warily by the clinical reconstructive surgeon. The authors have stopped using these materials at the

present time, pending the accumulation of further experimental and clinical information.

Two patients had surgical construction of the breast because of congenital and postoperative absence of the breast. In both of the patients a pedicled flap of mammary tissue was taken from the opposite breast; the construction was carried out in three stages. There were no complications following these procedures.

The breast was reconstructed in 6 patients. Five of these had burn scars on the chest involving the breast. In 4 the scar was excised and replaced with a large thick-split graft of skin, while in the fifth case a thoracoabdominal tubed pedicle was necessary to correct associated axillary contracture.

Secondary breast plastic procedures were done in 13 cases which could not be classified. In 4 cases of postoperative asymmetry with excessive scars, excision and revision of these scars was necessary. In 1 case a second revision of the breast was required for partial ptosis following reduction mammaplasty. Two cases were examples of partial mastectomy with revision of the mammary tissue following two previous mammaplasty procedures performed elsewhere. Two patients were treated with dermal fat grafts placed in the shape of an inverted "L" following supraradical mastectomy for carcinoma and were well satisfied with this procedure. —*Donald M. Clough, M.D.*

Mammaplasty; Indications, Technique, and Complications. ARCHIBALD MCINDOE and THOMAS DEE REES. *Brit. J. Plast. Surg.*, 1958, 10: 307.

THE AUTHORS describe in detail the indications, technique, and complications of their modified Biesenberger mammaplasty operation. The vast majority of patients undergoing this plastic procedure are women with obese and heavy pendulous breasts. Chronic cystic mastitis in the opinion of the authors is not a contraindication to this type of surgery.

This report concerns 347 consecutive cases of breast hypertrophy in which mammaplasty was performed. The classification, type of operation, complications, and end results are presented.

Postoperative hematoma is the most frequent and most serious complication encountered. Controlled hypotensive anesthesia has improved the results and decreased the operating time.

This operation is presented as a satisfactory one-stage mammaplasty with the preservation of nipple function and special attention to the blood supply from the lateral thoracic artery and the internal mammary artery. —*Edward F. Lewison, M.D.*

Postmastectomy Dressing with Suction, Atmospheric Pressure, and Breast Binder. G. B. SANDERS and D. W. KINNAIRD. *J. Am. M. Ass.*, 1958, 166: 1552.

THE PROBLEM of postmastectomy dressing is discussed by the authors with special attention to the accumulation of fluid beneath the flaps and circulatory embarrassment of the skin overlying the operative area.

The fundamentals of postmastectomy suction drainage are reviewed and compared with the usual routine of massive pressure dressings. The authors favor continuous suction, stent fixation of the graft, and a very light dressing. A commercial breast binder is employed which avoids a large occlusive dressing.

Since adopting this type of dressing technique for all simple and radical mastectomy operations, the authors have found a vast improvement in the preservation and viability of both the skin graft and the skin flaps. —*Edward F. Lewison, M.D.*

TRACHEA, LUNGS, AND PLEURA

Lobar Emphysema. HARRY W. FISCHER, JOSEPH L. LUCIDO, and CHESTER P. LYNXWILER. *J. Am. M. Ass.*, 1958, 166: 340.

WITHIN RECENT YEARS, a syndrome of dramatic respiratory symptomatology in infants has come under study. A newborn infant or child with severe respiratory difficulty and cyanosis, unrelated to infection or other known event, may be suffering from an uncommon respiratory lesion, obstructive emphysema of a single lobe. Physical examination may reveal hyperaeration over a limited area or a complete hemithorax. The heart is shifted away from the affected side; the poorer breath sounds are heard on the same side. Chest roentgenograms reveal a lobe area or an entire lung field to be radiolucent but still contain lung markings. Other lung tissue appears poorly aerated with the ipsilateral diaphragm depressed and the mediastinum shifted away from the affected side.

All of the aforementioned changes indicate an obstructive, localized emphysema. The critical respiratory status is secondary to the decreased function of the remaining lobes, which are encroached upon by the distended emphysematous lobe. There may also be a decreased venous return to the heart. Lobectomy has been required in these patients for relief of symptoms and the saving of life.

An illustrative case is presented in which a 2 day old infant was found to have a right sided emphysema due to middle lobe distension which required right middle lobectomy. The postoperative course was uneventful and no pathologic change could be found which might have caused the emphysema.

Since 1932, 38 cases of lobar emphysema have been reported. An increasing incidence may be due to earlier use of roentgenography in seriously ill newborns and an increasing awareness of the disease in these physicians who care for newborns. The disease is best diagnosed by x-ray examination including anteroposterior and lateral films. The persistence of lung markings in the radiolucent area is helpful in making the diagnosis. Another helpful diagnostic point is the lack of response to bronchoscopy and tracheal suction to which the more common atelectasis-emphysema complexes usually respond.

One-third of the reported cases of lobar emphysema have been associated with a bronchial cartilage abnormality causing a check-valve mechanism. In addition, extrabronchial compression by anomalous vessels or redundant intrabronchial mucosal folds have been known to act in a similar manner. This condition is separable from the rare congenital cystic lung.

Treatment of this condition must depend on the severity of the symptoms and the degree of threat to life. After a short period of medical treatment including administration of oxygen and tracheobronchial aspiration by catheter and bronchoscope, the situ-

ation should be evaluated and if the physical and radiologic findings are minimally improved, surgical intervention is advised. However, there is some evidence that some of these children can be tided over the acute episode by conservative measures. Their further course is uncertain, some have a return of the acute symptomatology and others reach a normal state. The penalty of permanent anoxic damage to the brain must be thought of in every case.

The operative mortality as reported has been very low. Only one of 33 patients who were operated upon died. There are 7 reported cases of patients who were conservatively treated and all of whom died. Of 4 others who were medically treated all returned to a normal life.

The decision for mode of attack on the lesion at the time of surgery will depend upon the type of lesion found. Certainly needle puncture of the lobe appears to be inappropriate. In 31 of 36 cases which can be traced, there has been no return of symptoms after lobectomy. —*John J. Bergan, M.D.*

Traumatic Rupture of the Bronchus; Treatment by Reconstruction of the Bronchus (Les ruptures bronchiques traumatiques; leur traitement par reconstruction bronchique). P. SANTY, M. BÉRARD, and M. LATARJET. *J. fr. méd. chir. thorac.*, 1957, 11: 569.

THREE CASES of patients with traumatic rupture of the bronchus who were treated by thoracotomy and reconstruction of the bronchus are reported.

The first was a 6 year old child who was struck on the thorax with a rock. A large amount of air was aspirated from the left pleural cavity soon after the injury. Following this, the entire left lung remained atelectatic. Five months after the injury a left thoracotomy was done and a stricture of the bronchus found. The entire left lung had collapsed. Repair of the stricture permitted re-expansion of the lung. Postoperatively, bronchoscopy and insufflation of the lung with positive pressure were necessary on five occasions to maintain expansion. The patient has been traced for 4 years postoperatively and has remained in excellent health.

The second patient, a 16 year old girl, also had an atelectatic lung following an injury. A stricture of the bronchus was visualized bronchoscopically. Three months after the injury a Machray sound was passed into the injured bronchus through a bronchoscope. A thoracotomy was then done and the involved bronchial segment identified with the sound in place. Considerable mucus had accumulated distal to the stricture. The mucus was removed and segments of the lung were re-expanded under positive pressure. The stricture was repaired by suture. Postoperatively, bronchial aspiration was necessary for several days to maintain expansion of the lung.

The third patient was operated upon 24 hours after an automobile accident. This 14 year old child had a pneumothorax which was aspirated but soon reappeared. Thoracotomy was done and a 1 cm. tear in a posterior bronchus was discovered after extensive dissection. It was repaired by suture and a satisfactory recovery followed.

The authors state that practicing physicians should be able to recognize or suspect rupture of the bronchus and should realize that early surgical repair of these lesions gives excellent results.

—*Frederick W. Preston, M.D.*

Palliative Treatment of Neoplastic Pleural Effusion with Intercostal Intubation and Talc Instillation. JOHN S. CHAMBERS. *West. J. Surg.*, 1958, 66: 26.

IN PATIENTS with metastatic neoplastic disease of the lungs followed by pleural effusion, 50 to 70 per cent have had some relief from intrapleural instillation of radioactive gold or nitrogen mustard. Such improvement is generally attributed to the cancerocidal properties of these substances. However, both these substances are irritating, and since adhesive pleuritis has been reported after such measures it was theorized that the obliterative pleuritis was responsible for the palliation of pleural effusion, not the cancerocidal effect.

In 30 patients with pleural effusion accompanying proved neoplastic disease, obliterative pleuritis was induced by the following method. The patient was hospitalized and under local and intercostal anesthesia a Pezzer catheter was inserted through an intercostal space and the fluid removed. Then 2 to 4 drams of sterile talc powder suspended in one per cent procaine solution were injected through the catheter. The catheter was removed 1 to 3 days later and the patient discharged.

Of 20 patients who were traced 1.5 years or more, 17 needed no further paracentesis. In some of these the control of the effusion seemed to be a factor in prolonging the survival. One patient had had no relief after previous intrapleural gold, but had complete relief from talc instillation. In the 3 patients with incomplete control, failure was attributed to previous shrinkage of diseased lung tissue so that complete obliteration of the pleural space was mechanically impossible. None of the additional 10 patients with shorter follow-up required subsequent thoracentesis.

This method of control of pleural effusion from neoplastic disease appears to be superior to intrapleural instillation of nitrogen mustard or radioactive gold. —*Stanley W. Tuell, M.D.*

The Pathogenesis and Symptomatology of Bronchiectasis as Related to Surgery (Studio eziopatogenetico e clinico delle bronchiectasie in rapporto alla terapia chirurgica). ETTORE PRETTO. *Fracastoro*, 1957, 50: 495.

THE ANATOMIC CHARACTERISTICS of the lung important to the discussion of the genesis of bronchiectasis are discussed. The author divides the pulmonary segments into dependent segments (basal segments of the lower lobes, middle lobe, and lingula) and nondependent segments. The anatomy of the tracheobronchial lymph nodes and the relation to compression of the bronchial tree and interference with bronchial drainage is discussed.

The author classifies bronchiectasis as primary bronchiectasis; symptomatic bronchiectasis, i.e. that produced by an obstructing tumor of the bronchus; and secondary bronchiectasis, in which the primary cause is no longer apparent.

The various hypotheses on the etiology of bronchiectasis are discussed. The author considers that the

role of primary tuberculous infection and the Ghon complex are important in the formation of bronchiectasis in the adult. The pathologic process produces a gradual obstruction of the bronchial tree. The dependent segments are more vulnerable. In other cases the role of a childhood pulmonary infection, such as bronchopneumonia complicating measles, is obvious. Associated with such causes, there may be a congenital weakness of the wall of the bronchial tree. Although its mechanism is poorly understood, the factor of upper respiratory infection, particularly of the nasal passages and sinuses, is a very important one.

The signs and symptoms of bronchiectasis are reviewed. Only 10 per cent of the patients have normal lung fields on plain chest roentgenograms. Plain chest roentgenograms and tomograms often reveal enlarged tracheobronchial lymph nodes. Bronchograms are essential for the anatomic diagnosis. Water soluble media are preferable to oily suspensions although they tend to cause more irritation and coughing. Bronchoscopy is essential to evaluate the existence of bronchostenosis and the degree of suppurative disease. Sputum cultures to determine the type of bacterial flora and its sensitivity to antibiotics are an essential part of the examination. The existence of a chronic infectious process in the nasal passages and sinuses should be investigated.

The treatment involves: (1) vigorous management of nasal and sinus infections, if present; (2) specific antibiotic treatment of bronchial suppuration (Antibiotics can be introduced into the bronchial tree by aerosol or by catheter); A consideration of a climatic change is important. Many of the patients will benefit by a change to a warm and dry climate.

The author formulates the following criteria for surgery: (1) absolute indications—bronchiectasis with recurrent hemorrhage, bronchiectasis with atelectasis such as that seen in the middle lobe syndrome, bronchiectasis with demonstrable bronchostenosis, and unilateral bronchiectasis involving the whole lung; (2) operation justified but indication not absolute—bronchiectasis associated with a suppurative process in the sinus or nose such as Kartagener's syndrome (This probably represents a diffuse disease of the entire tracheobronchial tree and the upper infection should be treated first), and asymptomatic bronchiectasis; (3) questionable indications—bilateral, diffuse bronchiectasis, and bronchiectasis complicated by tuberculosis or empyema.

Pulmonary resection offers the best results in patients between the ages of 5 and 12. After 60 years of age palliation by medical treatment is preferable to surgery. —*René B. Menguy, M.D.*

The Prognosis of Bronchiectasis in Childhood. ALFRED WHITE FRANKLIN. *Arch. Dis. Childh.*, Lond., 1958, 33: 19.

THE RESULTS in the series of 171 cases reviewed are good. The bad cases, the 15 patients who remain invalids, are bad indeed, and to prevent such cases seems the only solution. The prognosis is worst when onset occurs under 2 years of age. The respiratory tract is often involved as a whole, the bronchial dilatation being only a part of what is wrong. The extent of the disease is unlikely to change, so that repeated bronchography with its slight though definite risk is unnecessary.

Selection of cases for operation requires prolonged observation and deep knowledge of the individual case. In assessing the prognosis before deciding on treatment the natural history of bronchiectasis should be remembered and the whole child and his environment considered, in order that treatment is avoided which might be more harmful than the disease itself. —*John J. Maloney, M.D.*

Oil Granuloma of the Lung; Report of 3 Cases. A. H. M. SIDDONS. *Brit. M. J.*, 1958, 1: 305.

THE AUTHOR reports 3 cases of oil granuloma of the lung. Each of these simulated, both clinically and radiologically, a bronchial carcinoma and was treated by resection.

Most cases reported in the literature have been caused by collections of liquid paraffin, patients having taken the substance by mouth or as nasal drops or spray. Mineral oils are not the only source of this trouble however, vegetable and animal oils and various fats have also been indicted. In addition there is a special group of cases due to poppyseed oil used for bronchography. These exogenous oil and fat granulomas must be distinguished from lesions containing endogenous fatty substances occurring in association with bronchial obstruction and generalized disturbances of fat metabolism. Previous case reports have shown that, although the disease may occur at any age, it is fairly common in babies with feeding disturbances, in whom milk may reach the lungs, where its fat content tends to remain and is much more slowly removed than the other constituents. At the other extreme of life it becomes more common again, so that in a hospital in which the aged are treated for such conditions as neurological disorders (especially Parkinsonism), cerebrovascular disease, and rheumatoid arthritis it has been reported in as many as 14.6 per cent of inmates. This high incidence is presumably associated with disturbance of swallowing; the condition has been reported many times in association with achalasia of the cardia.

The symptoms are often minimal, although some cough and breathlessness are common and occasionally there is hemoptysis. These patients, however, often develop lung infections in association with the oil granuloma, and it is in this way that most of such cases come to light. The recognition of oil granuloma may avoid an unnecessary operation, though even at operation the differential diagnosis from carcinoma may be very difficult, but if made will allow of a less extensive resection than that designed for malignant disease.

The first case reported is that of a man of 72 who reported sick because of recent cough and dyspnea. Examination revealed abnormal signs at the base of the left lung, and the roentgenogram showed a lesion in the posterobasic segment of the left lower lobe. No abnormality was seen bronchoscopically. At operation an exceptionally hard "cobblestone" mass was felt in the lower lobe and the lobe was removed. The specimen contained a firm, fairly well demarcated greyish mass in the lateral basal segment. The bronchi were normal. Microscopic examination showed a

mesh of dense fibrous tissue containing numerous large vacuoles of lipoid material. A foreign body giant cell reaction was present in some areas, and there were similar changes in the hilar lymph nodes. Subsequent questioning of this patient elicited the fact that he habitually took liquid paraffin as a laxative.

The second case reported is that of a woman age 56 in whom a mass was found in the right middle lobe by x-ray examination. She was almost symptom-free except for a dry cough. No abnormality was seen on bronchoscopy. At operation a hard, rounded lesion about 1.5 inches in diameter was found and examination by frozen section confirmed the diagnosis. The middle lobe was resected and this contained a very firm greyish mass. Microscopically this was found to be a dense fibrous tissue meshwork enclosing large droplets of lipoid material, with a few small areas of active inflammation and giant cell reaction. This patient denied taking liquid paraffin by mouth or using nasal sprays or drops at any time.

The third case is that of a man age 41 who had achalasia which had been treated by a Heller's operation. He complained of pulmonary infection and breathlessness in addition to his dysphagia. A chest x-ray revealed a mass in the right upper and middle lobes. His sputum was not examined for fat, and bronchoscopy revealed no abnormality. At operation a large, hard, lobulated tumor mass was seen in the right upper lobe with a fingerlike process extending into the middle lobe. Frozen section at operation established the diagnosis of lipoid granuloma, although this did not exclude the possibility of a small carcinoma within the mass. The right upper lobe was resected and the specimen contained a well-defined firm area in the posterior segment consisting of grey, semitranslucent tissue. The bronchi appeared normal. Microscopic examination showed the presence of very numerous droplets of lipoid material.

The clinical and x-ray findings in these 3 cases suggested a carcinoma, but in each of them one would have expected the carcinoma to be visible at bronchoscopy. The presence of fatty globules in the sputum is strong evidence of oil granuloma and is undoubtedly the most helpful guide to the diagnosis. The x-ray appearance of these lesions is not particularly characteristic and does not allow certain distinction from carcinoma or from the "pneumonias."

—Donald M. Clough, M.D.

On the Morphology of Bronchial Cylindromas (Zur Morphologie des "Bronchialcylindroms"). ULRICH FUCHS. *Arch. Geschwulstforsch.*, 1958, 12: 1.

CYLINDROMAS are a recognized subclassification of bronchial "adenomas." Mucous gland types of cylindroma have been described in the literature, and adenomatous hyperplasia of mucous glands of the bronchi has been listed as a cause of bronchial stenosis. The author reports a unique case of a cylindroma of the bronchus to the lingula, symptomatic for 6 years, and associated with hyperplasia of the adjacent bronchial mucous glands.

Polypoid but infiltrative neoplastic masses covered by viscous mucus obstructed the bronchus to the lingula at its origin, extended 4 cm. peripherally, and was associated with considerable bronchiectatic dilatation of distal bronchi. The bulging intrabronchial portions of the tumor were covered by bronchial mucosa with conspicuous mucous glands. Small peripheral tumor masses were composed entirely of such hypertrophic bronchial glands of pure mucous type, encompassing cystic spaces. Other authors have considered that bronchial adenomas, and especially cylindromas, arise from pre-existing normal seromucous bronchial glands. The histologic findings in this case suggest that there may be a relationship between the origin of abnormal bronchial glands, entirely mucous in structure, and bronchial cylindromas. The excessive production of mucus by this tumor, and the mechanisms of bronchiectasis, are discussed.

The literature concerning cylindromas of the lower respiratory tract, including symptomatology and therapy, is briefly reviewed. Bronchial carcinoid adenomas are approximately ten times as frequent as cylindromas. The latter arise especially in the trachea and main stem bronchi, with only 3.3 per cent situated peripherally. About a third of the cylindromas metastasize, most frequently to the hilar and mediastinal lymph nodes, but also distally. Only about a tenth of the carcinoid adenomas metastasize. Cylindromas more than 5 cm. in diameter have been present for longer than 8 years. *—Elmer V. Dahl, M.D.*

Combined Roentgen Therapy and Nitrogen Mustard in Carcinoma of the Lung As Compared to Other Methods. K. L. KRABBENHOFT and T. LEUCUTIA. *Am. J. Roentg.*, 1958, 79: 491.

THE AUTHORS present a series of 393 histologically proved cases among a total of 788 cases of carcinoma of the lung seen between the period from 1922 through 1956. There has been a marked increase in the incidence of carcinoma of the lung in recent years and this increase is reflected in a table for each 5 year period during the time of the study. The survival time was used as a criterion of treatment efficacy to avoid inaccuracies in subjective and symptomatic interpretation. The cases were divided histologically into squamous cell carcinoma (20, 8 per cent), adenocarcinoma (8, 9 per cent), oat cell carcinoma (66 per cent), Pancoast tumors (3, 6 per cent), and alveolar cell carcinoma (0.7 per cent).

From 1922 through 1932, 200 kv. roentgen therapy was used and from 1932 to 1957, 550 kv. roentgen therapy was employed. Since March, 1957 2 Mev. roentgen therapy has been instituted. During the period of 1929 through 1945, 30 patients were treated with combined roentgen therapy and intrabronchial radium, an average dose of 4,460 roentgens (gamma) to a depth of 1 cm. from the intrabronchial source was delivered supplementarily to the external therapy. The survival rates in this group were tabulated and compared with a group of patients receiving roentgen therapy and nitrogen mustard. Only 5 patients in a far advanced stage of their disease received nitrogen mustard only. The average survival of these groups is tabulated, and it was observed that a group of 132 patients treated by roentgen therapy alone survived an average of 8.8 months as compared with an average survival of 7.45 months for 226 who were treated with a roentgen therapy and nitrogen mustard combination. This was seen to be due to the inclusion

of many early cases in the group treated with roentgen therapy alone prior to the advent of the chemotherapeutic agents. When the results were tabulated according to histologic type and according to method of treatment, it was found that the percentage of undifferentiated and oat cell types of tumors in patients living up to one year increased from 50 to 58, 4 following the addition of nitrogen mustard to the therapeutic regime.

The authors employ a technique utilizing parallel opposing fields over the mediastinum and pulmonary areas involved and concomitantly administer nitrogen mustard in doses of 0.1 mgm. per kgm. daily for 4 consecutive days, following which the roentgen therapy is carried out to the conclusion of the treatment series. The results of this study compare with those of other investigators who have found that early survival rates were improved despite disappointing overall treatment results.

The authors conclude that despite this modest increase in survival, the continuation of the program is warranted in order to bring relief from pain and from other symptoms to patients during palliative treatment.

Primary Polypoid Spindle Cell Sarcoma of the Bronchial Mucosa in a 9 Year Old Girl (Primaeres polypoeses Spindelzellsarkom der Bronchialschleimhaut bei einem 9 jaehrigen Maedchen). RUDOLF GUBLER. *Thoraxchirurgie*, 1958, 5: 320.

PRIMARY SARCOMA of the lung and bronchi is a rare condition. Ochsner, *et al.* (1948) found 2 in 192 primary malignant tumors of the lung, Brunner (1951) 1 in 155, Dewes, *et al.* (1951) 2 in 502, Hood, *et al.* (1953) 1 in 27, and Vieten (1953) 2 in 502.

It is predominantly found in the younger age group. The cases are equally divided between both sexes. The symptoms of the growing, predominantly endobronchial primary bronchus sarcoma are the result of progressive bronchostenosis with bronchiectasis, chronic pneumonia, and atelectasis. Diagnosis can only be established by biopsy.

The patient, a 7.5 year old girl, was hospitalized with a low grade fever without any other symptoms. Chest x-ray disclosed the cause as a dense area in the right upper lobe without involvement of the hilar lymph nodes. The child was observed in a sanatorium under the presumptive diagnosis of tuberculosis. The dense area increased in size. The patient continued to have a low grade fever (38 degrees C.). Her appetite remained good and there was no coughing or sputum. The Mantoux test was negative on several occasions.

One and a half years after the first symptoms developed the temperature rose above 39 degrees C. and the child began to cough. She was transferred to a University Clinic and treated for atelectasis with antibiotics. The temperature returned to normal.

Bronchoscopy revealed a nearly complete obstruction of the right upper lobe bronchus by a pea-sized polypoid tumor. No biopsy was taken. She was operated upon under the presumptive diagnosis of obstructive bronchial adenoma and a right upper lobectomy was performed. The postoperative course was uneventful.

The tumor measured 15 by 7 mm. and blocked the posterior segmental bronchus completely. Microscopic examination revealed spindle cell sarcoma.

The patient's condition 9 months after operation was excellent and there was no evidence of recurrence or metastases. —*Henry Gans, M.D.*

HEART AND PERICARDIUM

Patent Ductus Arteriosus with Pulmonary Hypertension. HARRIS B. SHUMACKER, JR. and PAUL R. LURIE. *Arch. Surg.*, 1958, 76: 179.

THE AUTHORS describe their experiences with patent ductus arteriosus and pulmonary hypertension. Since 1950 the ductus has been divided in 31 cases associated with varying degrees of proved pulmonary hypertension. Undoubtedly, a fair number of patients other than the 31 with proved hypertension actually had elevation of pulmonary artery pressure.

Among the 31 patients with proved hypertension the elevation in pressure was mild or moderate in 13. The pulmonary artery pressure was only slightly elevated in 7 of the 13 patients. In the group of patients with mild or moderate hypertension, the ductus was found to be large or fairly large. All of the patients, except one who died, withstood operative treatment without difficulty.

In the remaining 18 patients there was evidence of marked pulmonary hypertension. All of these patients had cardiac symptoms. A number were in heart failure and were being treated with digitalis. Others had retardation of physical development. In all cases, after the ductus was dissected free, it was temporarily occluded in order to see whether the heart action and systemic blood pressure remained good. Occasionally, this was first accompanied by an alarming tachycardia, although on subsequent occlusion of the ductus this abnormal response ceased. In one case recatheterization, performed 3.5 years after operation, showed that the pressure values had returned to a nearly normal level. A large short ductus has been divided in stages rather than at once, with staged suture closure of the two ends as the division of the ductus is completed. In addition, hypotension has been induced when the aorta and ductus appeared difficult to manage safely because of high tension. Two of the 18 patients died. The remainder did well.

Twenty-two patients with coarctation of the aorta and patent ductus arteriosus have been treated surgically. The 6 preductal cases and one postductal case were associated with pulmonary hypertension. All 7 patients were successfully treated by ductus division and restoration of aortic continuity.

There were 8 patients with patent ductus and a ventricular septal defect. Six had pulmonary hypertension. In this group 3 patients died; one was little if any improved, and 4 are doing well.

Five very ill infants had patent ductus arteriosus, coarctation of the aorta, and a large ventricular septal defect. All died.

The surgical management of patent ductus arteriosus associated with pulmonary hypertension presents a more difficult problem than is encountered in the treatment of the usual case. The ductus itself is usually quite large and short and there may be sclerotic

changes in the adjacent aorta. However, the technical difficulties encountered at the time of operation have become progressively minimized with increasing experience.

A number of observations are recognized as being helpful at the time of exploration. The ductus should be temporarily occluded in order to see whether such occlusion is well withstood. One can gain information of prognostic value by measuring the pulmonary artery pressure before and after occlusion of the ductus. A drop in pulmonary artery pressure with occlusion of the ductus is a good sign. A rise, on the other hand, seems to be ominous. It is difficult to establish the risk involved in operating upon patients with patent ductus arteriosus and marked pulmonary hypertension. The mortality, however, was only about 10 per cent, and only one death was the result of an operative disaster.

It is imperative that patent ductus be recognized early and treated before progressive vascular sclerosis and pulmonary hypertension develop. Operation is justified even when moderate or severe hypertension is found to be present. This applies not only to cases with a left-to-right shunt but also to those with some reversal of flow. The authors' experience would indicate that treatment in such cases is effectual and relatively safe. It is exceedingly difficult to determine the absence or presence of reversal of flow or its magnitude in many of the cases reported. Reversal is established only by demonstrating desaturation of femoral arterial blood as compared with right brachial blood, the presence of clubbing of the toes, or of the toes and fingers of the left hand, and the passage of opaque medium from pulmonary artery to aorta on angiography. Pressure readings are inconclusive and sometimes misleading. The surgical results in those cases with apparent preponderant reversal have varied. In the rare patient in whom the flow is totally or largely reversed, the outlook without surgical treatment is hopeless. It seems logical, therefore, that such patients should be subjected to surgical exploration.

It might be wise first to attempt to create a smaller ductus by performing an end-to-side left subclavian-pulmonary artery anastomosis and then to proceed with the transection and suture of the ductus itself. Whether thus reducing the size of the pulmonary aortic shunt would permit survival is, of course, a matter of speculation.

In other cases the pathogenesis and clinical picture of patent ductus and pulmonary hypertension seem quite different. In them the fetal pulmonary resistance is apparently retained from birth with a balanced pulmonary and systemic resistance at all times. The shunt is demonstrably balanced and bidirectional. The authors have seen 4 such cases.

Their experience with the surgical treatment of patent ductus arteriosus associated with pulmonary hypertension was reasonably satisfactory. Of 13 cases with mild or moderate pulmonary hypertension, all except one patient survived and had good results. Among 18 patients with systemic or near-systemic pulmonary hypertension there were only 2 deaths. When patent ductus and coarctation of the aorta were associated with pulmonary hypertension, no deaths occurred in 7 patients. When associated with ventricular septal defect, management is a great deal more fraught with danger. Three of 8 patients died, and in a fourth no significant improvement took place.

The more complicated defects have carried a much worse prognosis in the authors' experience. They treated 5 infants who had patent ductus arteriosus, coarctation of the aorta, and large ventricular septal defects. None of the 5 survived more than a day or so.

The problem of pulmonary hypertension in patent ductus arteriosus not only is important in itself but has implications which apply to the management of other cardiac conditions. While the physiologic mechanisms, at least early in life, may be quite different in various disorders, pulmonary hypertension and pulmonary vascular sclerosis are common to them all. It would seem evident, therefore, that what is learned about the management of pulmonary hypertension in patent ductus arteriosus may be helpful in the solution of other problems. —*Arthur M. Simpson, M.D.*

Surgical Indications and Contraindications in So-Called "Surgical" Congenital Heart Disease (Indications et contre-indications opératoires dans les cardiopathies congénitales dites "chirurgicales"). J. BRET. *Lyon chir.*, 1958, 54: 223.

THE SURGICAL INDICATIONS and contraindications discussed pertain to cases of persistence of the arterial duct, stenosis of the aortic isthmus, and congenital heart affections associated with pulmonary stenosis.

Surgical indications will depend upon whether or not persistence of the duct is associated with congenital heart disease. If it is associated with the latter a distinction must be made between persistence of the duct associated with cyanogenic or noncyanogenic heart disease. In the former the duct functions as an anastomosis and must be spared. Also in cases of extreme Fallot's tetralogy, the duct is indispensable and the decision as to whether to spare it or close it can be made only following a pulmonary valvulotomy. The duct must likewise be spared in infantile stenosis of the isthmus, and in transposition of the arteries when a persistent duct is frequently associated with stenosis of an infantile type of isthmus.

In cases of isolated persistence of the duct, surgery is generally indicated because the structure is useless and dangerous. A systolodiastolic murmur indicates the presence of an isolated or predominant left to right shunt. However, in cases in which the shunt is exclusively from right to left, the duct may act as a safety valve. Surgery is contraindicated in the presence of an infectious endoarteritis. Indications have changed somewhat in this condition because of the efficacy of the antibiotics except, of course, when a resistance to antibiotics has developed.

Special indications and contraindications for surgery as influenced by different stages of development of the duct are listed. After 40 years of age, a duct that has not previously caused trouble is unlikely to do so. Surgery is indicated in the presence of pulmonary or cardiac complications, or occasionally as a preventive precaution. Surgery is indicated in cases of persistent arterial duct in which there is a systolodiastolic murmur. but no infectious endarteritis or cyanogenic heart disease.

In stenosis of the aortic isthmus in adults the decision to operate will depend entirely upon the age of the patient. In infants, operation is indicated in the presence of or with the threat of left ventricular hypertrophy. Between the ages of 18 months and 40 years persistent arterial duct should always be treated surgically. In patients who are otherwise healthy but suffer from occasional palpitations and precordial pain, operation may be indicated as a prophylactic measure to reduce hypertension and prevent later complications. In patients past 40 years of age, in whom operation has hitherto been contraindicated, the author suggests that a distinction be made between those with definite vascular and hypertensive symptoms in whom operation could be attempted with a graft should the aorta appear too atheromatous, and those apparently holding their own in whom it is possible to dispense with the operation. Special indications and contraindications to surgery depending upon the presence or absence of associated cardiac or vascular malformation are discussed. Aortic insufficiency and stenosis of the isthmus per se do not present serious contraindications to surgery. In the category of pulmonary stenoses, one has to consider three syndromes which may coexist to some extent, namely, the barrier syndrome, the syndrome of deficient pulmonary circulation, and the syndrome of anoxemia. Indications for surgery are urgent in cases of pulmonary stenosis without interventricular communication. The indications for the various types of Potts, Blalock, and Brock operations are specified.

Based on a series of 382 operations, the author concludes that a left-sided Potts operation is indicated for anastomosis of the descending aorta and left pulmonary artery, for the common or extreme type of Fallot's tetralogy with left aortic arch, and for tricuspid atresia in which the aortic arch is always normal. A terminolateral or terminoterminal anastomosis of the subclavian and left pulmonary artery (left-sided Blalock operation) is indicated for common or extreme Fallot's tetralogy with a right aortic arch. Pulmonary valvulotomy according to Brock's technique is indicated whenever an obstruction syndrome is present, as in pulmonary stenosis without interventricular communication and in cases of Fallot's tetralogy with slight dextraposition of the aortic orifice.

—*Edith Schanche Moore*

Systematic Arteriography of the Coronary Arteries Using Acetylcholine; Experimental and Clinical Findings (L'artériographie méthodique des artères coronaires grâce àéutilization de l'acétylcholine; Donneés expérimentales et cliniques). G. ARNULF and R. CHACORNAC. *Lyon chir.*, 1958, 54: 212.

ARTERIOGRAPHY of the coronary arteries has been attempted during angiocardiography but the image obtained is very irregular and primarily a matter of chance. Direct injection of the contrast medium into the ascending aorta above the sigmoid valves through a catheter introduced via the carotid or humeral artery requires enormous pressure to counteract the force of the blood stream ejected by the left ventricle. Injections under pressure are dangerous and may prove fatal, and the contrast fluid passes into the aortic blood bypassing the coronaries. Thus an aortogram of the thoracic aorta with no sign of the coronaries is obtained. Should the catheter penetrate directly into a coronary, the injection of the contrast medium may prove fatal.

During experiments on dogs with a view toward discovering a safe method of coronary arteriography, the injection was made and an x-ray taken at a moment when the heart had temporarily ceased beating because of an anesthetic accident. An excellent picture of the coronaries was thus obtained with a slight reflux into the left ventricle. Since it was possible to produce cardiac arrest of the proper duration with acetylcholine, a study was made of the dosage required. Following the injection of diodone as a contrast medium perfect pictures of the coronary arteries and their branches could be obtained. After 200 successful exposures in animals it was deemed safe to try the method in human subjects. For successful images the injection must be made into the arch of the aorta, a test injection of acetylcholine must be made to establish its effect and the duration of its action, and finally, the exposures must be made under favorable conditions.

An essential prerequisite is the acetylcholine test in which increasing amounts are injected under electrocardiographic control until a cardiac arrest of the required 6 to 10 seconds is attained. The arrest can be accomplished with a dose of 4 cg. to 20 cg. "acécoline" injected into an arm vein. The required dose will vary individually, particularly according to weight. The injection of diodone should be made as soon as the cardiac arrest is recorded, otherwise the contrast medium will be dispersed in the aorta before entering the coronaries. The injection of diodone usually lasts 6 seconds and an exposure is made 2 seconds before its termination. In preparation the patient should have had only a single injection of morphine and *no atropine* since the latter completely destroys the effect of the acetylcholine. It is wise, however, to have at hand a syringe of neutral sulfate of atropine in case of emergency, since the latter constitutes an efficient counterpoison to acetylcholine. The patient should be in the right anterior oblique position in order to avoid interference of the liver and heart shadows. It is best to ascertain the most favorable position for exposures in advance.

It was with these precautions that the authors made their first two successful arteriographic studies in the same patient with an ordinary x-ray apparatus and no seriograms. Nesdonal anesthesia with intubation was employed. It is suggested that seriograms would make it possible to follow the different stages of coronary circulation.

—*Edith Schanche Moore*

Coronary Heart Disease; Hemodynamic Principles and Their Therapeutic Applications. B. L. BROFMAN and CLAUDE S. BECK. *J. Thorac. Surg.*, 1958, 35: 232.

THE AUTHORS state that coronary heart disease continues to be responsible for at least one third of all deaths in the United States, and may actually be showing a real increase. With the development of improved methods there has been a justifiable renewal of interest in the surgical treatment of coronary heart disease. Accordingly it is the authors' purpose to establish a critical definition of the problem and to

present a reappraisal of certain fundamental principles which determine coronary blood flow to the myocardium.

In a hydraulic system at dynamic equilibrium, the various factors which influence flow can be defined on the basis of simple hydraulic principles. With respect to pulsatile flow in the arteries, however, these principles should only be applied in rough estimation of these interrelations, and in the coronary circulation this application is further modified by the influence of extravascular compression. However, for purposes of this presentation, certain generalizations may be derived:

1. Blood flow is proportional to the pressure gradient in a system.

2. Flow is also proportional to the square of the cross-sectional area of the vessel, or to the diameter of the fourth power; at critical levels, relatively small changes in the diameter of a vessel may result in profound alterations in blood flow.

3. Blood flow is inversely proportional to the viscosity. Blood with a normal hematocrit has approximately five times the viscous resistance to flow as does water.

Direct measurement of coronary arterial flow can be carried out in open-chest dogs by means of a rotameter and in closed-chest dogs by means of the nitrous oxide method with coronary sinus catheterization. Although direct measurement of flow in man is obviously impractical, the nitrous oxide method with coronary sinus catheterization has provided generally reliable data, but certain considerations may introduce significant errors. In patients undergoing heart surgery, simultaneous sampling from the coronary sinus, pulmonary artery, and systemic artery has provided an opportunity to determine oxygen extraction by the heart, and an index of the adequacy of coronary arterial flow. In the laboratory, the Mautz-Gregg backflow method, which measures the retrograde flow from the distal segment of an occluded coronary artery, is considered to provide a true measure of interarterial anastomotic function. These retrograde flows are a measure of the collateral bed and serve as a most valuable method for the evaluation of the efficacy of various methods designed to improve collateral circulation. In a series of 65 control dogs, the average backflow was found to be 3.8 c.c. per minute but in a series of 41 dogs previously operated upon (Beck I), the average backflow was found to be 8.5 c.c. per minute, which is approximately 25 per cent of the normal inflow.

The authors continue with a graphic representation of the coronary circulation with special reference to significant pathophysiologic influences. The coronary circulation may be characterized as a high-resistance circuit, in which, merely by an appropriate reduction in vascular resistance, large increases in blood flow to the myocardium are achieved. In a sense, the major coronary arteries serve as relatively passive, wide-bore tubes with a cross-sectional area normally capable of accommodating tremendous increases in blood flow without significant increases in perfusion (aortic) pressure. For the most part, the sum total of peripheral resistance is normally determined at the level of the arterioles and small terminal arteries; as mediated by metabolic, hormonal, and nervous influences, changes in the smooth muscle of these vessels regulate the bore of the coronary bed. Normally, at rest, myocardial oxygen extraction is so high that increased oxygen consumption by the heart, as during exercise, is achieved primarily by increased flow. Increased flow is readily accomplished by a decrease in arteriolar resistance so that the pressure head arrives at the capillary bed at a higher level. A twofold increase in the arteriolar bed results in a fourfold increase in flow with no significant alteration in perfusion pressure or in major coronary artery cross-sectional area. With progressive reduction of the lumen of a major coronary artery, coronary flow at rest is not compromised until the cross-sectional area approaches approximately 10 per cent of normal. At this level, the artery bore also becomes a determinant of coronary flow and reduces the pressure head arriving at the arteriolar bed so that, unless there is a reduction in arteriolar resistance, a deficit in coronary flow results, even at rest. During exercise, in which increased flow is needed, an even greater deficit occurs. In cardiac hypertrophy in which coronary flow per 100 gm. of heart muscle is normal, total coronary flow at rest is increased. In severe coronary stenosis the cross-sectional area of the major coronary artery and the arteriolar bed are both determinants of coronary flow; compensatory arteriolar dilatation is still effective in restoring flow to normal at rest (although coronary reserve is obviously reduced). The distribution of coronary blood flow is determined by local resistance. Hypoxia is a powerful coronary vasodilator; as a given area becomes ischemic, its resistance falls, thus encouraging preferential flow to that area. Parenthetically, this reduction in resistance, which is a relative increase in pressure gradients from adjacent beds, also encourages intercoronary collateral blood flow from these regions. Even at a critical level of severe coronary stenosis, total coronary flow can still be raised above 100 per cent of normal by maximal arteriolar dilatation.

Nitroglycerin can be shown to exert its effect at the arteriolar level; presumably, its clinical benefit depends upon potentiation of the vasodilatation produced by local ischemia. However, at those levels of flow in which the arterial stenosis becomes the sole determinant of coronary flow, no further increase in flow is possible despite a maximal reduction in resistance. With a slight further reduction in lumen (down to approximately 5 per cent of its cross-sectional area), the major artery now becomes the sole determinant of coronary flow so that, despite maximum arteriolar dilatation, a deficit occurs. Clinically, this marks the onset of (1) status anginosus, (2) sudden death associated with oxygen differentials between the ischemic area and adjacent well oxygenated areas, and (3) acute myocardial infarction, even without complete artery occlusion. With reduction of cross-sectional area below a critical level (even though complete occlusion has not yet occurred), catastrophe is imminent unless adequate development of functional collaterals has preceded the occlusive process. If this has occurred, a potential deficit to a given area may be averted. With an adequate pressure gradient, a group of small collateral vessels may provide a comparatively abundant blood supply to a

potentially ischemic area. In a fundamental sense, the primary determinant of coronary blood flow is the perfusion pressure existing at the coronary ostia and, more important, the pressure gradient which ultimately drives the blood across the capillary bed. Hypertension increases the work of the heart and, particularly when cardiac hypertrophy has occurred, myocardial oxygen utilization and coronary blood flow requirements may be many times the normal. Myocardial ischemia may then result from a degree of coronary stenosis which normally would have permitted adequate flow.

When there is severe coronary artery stenosis, an all-or-none relationship may obtain. With normal aortic perfusion pressure there is no blood flow to a given area, whereas when hypertensive levels are reached, only then, is there achievement of significant blood flow. Conversely, when reduced below a critical level, perfusion pressure becomes inadequate to overcome viscous resistance to flow and a deleterious relationship is established.

Clinically, an apparently paradoxical response to antihypertensive therapy has been observed quite frequently. Instead of the anticipated alleviation of symptoms in patients with hypertension, reduction of blood pressure to "normal" has precipitated symptoms of coronary insufficiency in many patients, with occasional catastrophic consequences.

The coronary vascular bed exhibits a remarkable degree of reactivity in response to various stimulants. Hypoxia or, more specifically, myocardial ischemia is considered to be the primary physiologic regulator of such reactivity. Even in the presence of severe coronary artery sclerosis, such reactivity is still a major determinant of coronary blood flow. The authors comment on the fact that most coronary catastrophes occur at rest, and hence it has been assumed that undue stress is rarely the cause, except in certain situations of most strenuous exertion. The authors believe, however, that there is a frequent cause and effect relationship between severe stress and subsequent heart attacks, which attacks mostly occurred at rest, but the proximate cause appeared undeniable. The fact that there is a period of relative inactivity between the stress and the actual attack should not be allowed to obscure their relationship. The significant observation is that the increase in coronary blood flow, associated with various forms of coronary vasodilator activity, is almost invariably followed by a "rebound," or "dip" phenomenon, so that coronary blood flow is then below normal for extended periods of time. It is suggested that such a period of relative vasoconstriction following a period of increased blood flow may well have obvious clinical implications.

Basically, the extent of coronary arterial occlusion, per se, is not the primary determinant of the clinical manifestations of coronary heart disease; rather, it is the adequacy of the collateral circulation which determines the clinical course. By and large, the collateral circulation of the myocardium is almost exclusively a function of interarterial anastomoses. In hearts with chronic occlusion of one or even, apparently, of all major coronary arteries, the absence of significant myocardial injury should no longer be considered a medical curiosity which defies scientific explanation, but rather an impressive demonstration of the tremendous potential for protecting the myocardium provided by adequate intercoronary collaterals. Generally, any factor which decreases arteriolar resistance (thereby increasing coronary blood flow), and thus exaggerates pressure gradients from adjacent pre-arteriolar beds, will stimulate increased collateral flow. This appears to be the case with known stimulators of collateral circulation: anemia, anoxia, exercise, and such pharmacologic agents as the nitrites. Although adequate intercoronary anastomoses in advance of the occlusive process are truly beneficial, the extensive collaterals resulting from coronary occlusion and myocardial infarction are not necessarily salutary and may actually be deleterious. In encouraging perfusion of a scar, which represents a low resistance bed, a functional arteriovenous fistula may be produced. Preferential flow to this area would then deprive adjacent and still viable myocardium of critically needed blood. This phenomenon may very well explain the frequently observed clinical picture whereby following acute myocardial infarction there is apparent clinical improvement until the tenth to fourteenth day, at which time rapid deterioration and death supervene. It is possible that at this time the full development of collateral circulation is generally achieved.

The authors comment on direct surgical approaches to coronary heart disease and caution against disregarding certain fundamental but neglected considerations with regard to the pathophysiology of coronary heart disease. —*Donald M. Clough, M.D.*

Internal Mammary Artery Ligation for Coronary Insufficiency; an Evaluation. RALPH ADAMS. *N. England J. M.*, 1958, 258: 113.

CASE REPORTS of 4 patients who were treated by internal mammary artery ligation for coronary insufficiency are presented. Three of the patients treated believed themselves to be significantly benefited or relieved of pain by the operation. One patient had no pain. Pain disappeared in 2 cases before the vessels had been ligated, but after the patients thought that they had been ligated. Relief of pain in the fourth patient was related to lessened physical activity. Symptomatic improvement was not supported by objective clinical tests in any of the cases. One of the 4 patients is now dead; the remaining 3 are believed to show changes indicative of progressive myocardial damage. —*W. Foster Montgomery, M.D.*

Revascularization of the Myocardium. Cardiosplenopexy; Technique and Experimental Results (Rivascolarizzazione del miocardio. La cardiosplenopessia; tecnica e risultati sperimentali). G. FAVACCHIO and R. CAMINITI. *Ann. ital. chir.*, 1957, 34: 503.

THIRTY-ONE DOGS were used as experimental material. The animals were divided into 3 groups. In the first group (10 dogs) the heart was exposed and the left coronary artery or one of its branches was ligated. In these animals the electrocardiogram disclosed signs of myocardial ischemia immediately after the ligation. Seven dogs died within 8 days. In each animal autopsy disclosed a more or less extensive cardiac infarct.

In the second group (10 dogs) cardiosplenopexy was done; 2 operative deaths resulted, one 6 hours and one 48 hours after the operation. In the first a great deal of the splenic parenchyma had been cut away from the splenic stump before its transference to the thorax and fixation to the cardiac muscular wall; in the second the intact spleen was used, and a portion of it brought through an opening in the diaphragm. The diaphragmatic margin of the opening seemed to produce interference with the blood supply permeation of the spleen.

In the third group (11 dogs) the two procedures were combined. The abdomen was opened, the spleen mobilized and transferred to the thorax through an incision in the diaphragm. After the chest was opened, the stump (reduced about three-fourths in size but with its most vascular part retained) was sutured to the denuded myocardial surface (Fig. 1) over the ischemic left ventricle. Only 1 animal died (91 per cent survival).

The surviving animals of this group recovered rapidly from the effects of the operation. After 30 days electrocardiographic and histologic studies showed that the splenic stump had healed to the myocardial wall and connections with the vessels of the myocardial tissues had been established. An injection of minium and gelatin into the splenic artery was found within the myocardial vessels.

The authors emphasized the importance of thorough mobilization of the spleen and its blood supply, careful rotation of the splenic stump so as to unite it to the raw surface of the heart without tension, and crushing of the left phrenic nerve. The procedure is easy to do, is relatively safe, and shows results sufficiently to justify further experimental study.

—John W. Brennan, M.D.

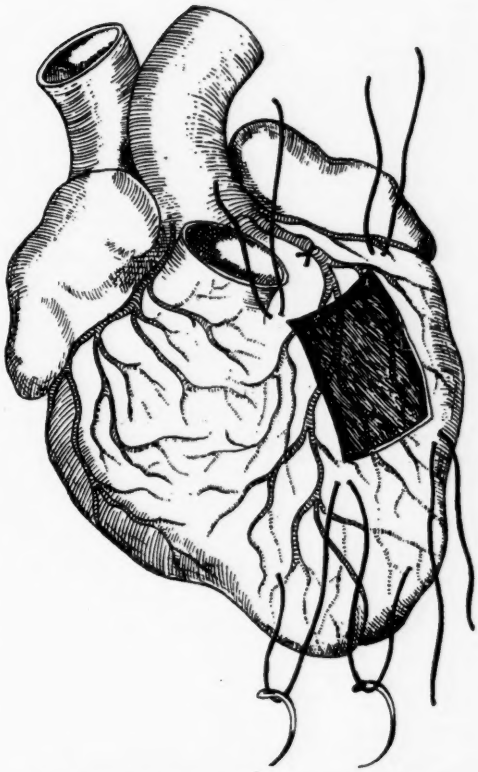

FIG. 1 (Favacchio, Caminiti). The denuded cardiac surface over which the splenic parenchyma is sutured. Above it is indicated the ligated anterior descending coronary artery.

Pulmonic Valvular Stenosis Associated with Interatrial Septal Defects. J. L. EHRENHAFT, E. O. THEILEN, and MONTAGUE S. LAWRENCE. *Dis. Chest.*, 1958, 33: 193.

CLINICAL INVESTIGATION and surgical treatment of patients with valvular pulmonic stenosis and with atrial septal defects has shown frequent coexistence of two lesions. These associated anomalies were encountered 12 times in a series of 50 patients with atrial septal defects, and the authors summarize their experience with this particular combination of lesions.

Valvular pulmonic stenosis with a right to left shunt at the atrial level is the second most common cause of cyanotic congenital heart disease. In this series of 12 patients with diagnoses verified at open cardiotomy, pulmonic valves were malformed in every instance and produced significant obstruction. In each instance the atrial septal defect was an open communication between the atria rather than a probe patent foramen ovale. All the defects were of the ostium secundum type. Some of them were fenestrated and others had the appearance of a greatly dilated foramen ovale. The age range of these patients was 3.5 to 30 years. Eight of the 12 were females. Growth and development were abnormal in 7 patients but no clear-cut relationship either to the severity of the pulmonic stenosis or to the size and direction of the atrial shunts was evident.

The symptoms of these patients were fatigue and decreased exercise tolerance manifested primarily by shortness of breath on exertion. Constant cyanosis was present in 3 patients and according to the history had been life-long in 2. Four had a history of intermittent cyanosis related to exertion. Physical findings were dominated by signs of pulmonic stenosis. In those patients with right to left shunts it was often possible to differentiate this lesion from the tetralogy of Fallot on the basis of auscultatory findings. Characteristically a loud harsh systolic murmur of medium pitch lasting throughout systole was maximal in the second and third left intercostal spaces at the parasternal line. The murmur often radiated toward the left shoulder at the level of the second interspace. The 3 patients who were cyanotic at rest had clubbing of the fingers and toes. Electrocardiographic changes of right ventricular hypertrophy were present in 8 patients. The changes of both incomplete right bundle branch block and right ventricular hypertrophy occurred 3 times. Roentgenographic examination including cardiac fluoroscopy was helpful in establishing the diagnosis when post-stenotic dilatation of the pulmonary

artery could be demonstrated. In the cyanotic patients right to left interatrial shunts occasionally could be demonstrated by angiocardiography. The vascular markings were not particularly indicative of reduced pulmonary flow, even when rather severe stenosis was present. They were definitely decreased in only 2 patients.

Cardiac catheterization was done in all of these patients. In addition to determining arterial oxygen saturation at rest and while breathing room air, oxygen content was also measured after the patient breathed 100 per cent oxygen for 10 minutes.

The patients were divided into two groups according to whether the shunts were predominantly left to right or right to left. It was predominantly right to left in 5 and left to right in 7. Three of the 5 with right to left shunts were definitely cyanotic; 2 were not obviously cyanotic at rest but had reduced arterial oxygen saturations. Right to left shunts varied from 20 to 40 per cent of total right atrial flow. Right ventricular systolic pressures exceeded the systemic arterial systolic pressure in 3 patients by 30 to 90 mm. of mercury. This was a helpful point in concluding that the ventricular septum was intact. It was possible to catheterize the left atrium in 9 of the 12 patients of this series. Right atrial pressure was greater than left atrial pressure in 2 with right to left shunts; in 3 others with right to left shunts right and left atrial pressures were essentially the same although both were higher than normal. Left atrial pressure exceeded right atrial pressure in 3 with left to right shunts and was essentially the same in one. The differences in most of the atrial pressure measurements were relatively small and in some instances may not be particularly significant.

The aim of surgical treatment must be obliteration of the shunt between the atria and the reduction of the gradient between the right ventricular and pulmonary artery pressures. Pulmonary valvulotomy and closure of the atrial septal defect were accomplished in all of these patients. Operation was done by direct visual control in a bloodless operative field which the authors considered essential for the correction of the defects with optimum results. These patients were managed by the supplementary use of generalized body hypothermia. Inflow and outflow tract occlusion of the large vessels with temporary exclusion of the heart permitted a direct approach to the stenotic pulmonic valve. During a second period of occlusion right auriculotomy and closure of the atrial septal defect were easily carried out. Eleven of the 12 patients were prepared for open cardiotomy by this method while one was placed on the extracorporeal circuit and pump oxygenator for repair of the defects. Uniformly, the pulmonic stenosis encountered was of the valvular type. The stenosis was formed by fusion of three semilunar valves into a cone-shaped structure that produced varying degrees of right ventricular outflow tract obstruction. Associated muscular infundibular stenosis was not observed in any of the patients. Moderate to severe post-stenotic pulmonary artery dilatation was found in all patients with low or normal pulmonary artery pressures.

The interatrial septal defects were all of the ostium secundum type. The diameters varied from 1 cm. to 5 cm. The authors state that they believed most of these defects resulted from dilatation of the foramen ovale. There were no deaths in this series. Generally the postoperative courses were uncomplicated. The authors suggest that since the most common associated defect in patients with valvular pulmonic stenosis is an atrial septal defect, atrial exploration is indicated in all patients undergoing surgery for valvular pulmonic stenosis and that a method permitting correction of both defects at the same operation by open cardiotomy be used. —*Donald M. Clough, M.D.*

The Surgical Treatment of Stenotic or Regurgitant Lesions of the Mitral and Aortic Valves by Direct Vision Utilizing a Pump-Oxygenator. C. Walton Lillehei, Vincent L. Gott, Richard A. DeWall, and Richard L. Varco. *J. Thorac. Surg.*, 1958, 35: 154.

The difficulties involved in correcting certain lesions, especially those of the acquired type about the aortic and mitral valves, have made total cardiopulmonary bypass and open cardiotomy the treatment of choice in such lesions. Eight patients have been operated upon for aortic stenosis utilizing a pump-oxygenator, in combination with retroperfusion of the coronary sinus.

Of the 8 patients who were operated upon 3 had congenital valvular stenosis, 1 had a congenital subvalvular stenosis only, and in the remaining 4 patients the aortic valve was the site of acquired disease. In the congenital valvular lesions the leaflets were soft, pliable, and allowed precise commissurotomy under direct vision. The operation consisted of converting the aortic valve to a bicuspid valve. In the acquired disease group the valves were heavily laden with calcium and if the commissures could be delineated they were incised. If the commissures were completely obliterated, two imposing incisions were made, forming a bicuspid valve which functioned well. In all cases the surgeon's finger or a dilator was passed through the valve to insure an adequate orifice and aid in mobilizing the leaflets following the placement of the incisions.

Four of the 7 patients with aortic stenosis are living and well with excellent clinical results. The patient with predominant aortic regurgitation also has maintained an excellent clinical improvement. There were 3 deaths in this group of 8 aortic valvuloplasties.

Retroperfusion of the coronary sinus has also been utilized for the repair of aortic pulmonary septal defect, ruptured aneurysms of the sinuses of Valsalva, and complete transposition of the great vessels.

The treatment of aortic regurgitation has been dependent upon the placement of a prosthesis until recently. When the pathological specimen is examined it is found that the leaflets are quite frequently supple and there is little or no calcium present. This is markedly different from the findings when the patient has aortic stenosis. The same comparison applies in the lesions of the mitral valve. In the patient with rheumatic heart disease and acquired aortic insufficiency annular dilatation has not appeared to be a significant factor but rather a failure of the cusps to close tightly because of thickening and curling of the cusp edge. In these patients the authors have converted the tricuspid aortic valve into a bicuspid orifice and reinforced the

lips of the bicuspid valve with compressed ivalon sponge.

Three patients have had some attempt made at correction of a significant degree of aortic insufficiency. In the first patient the correction was made by simple suture converting a tricuspid aortic valve into a bicuspid valve. The aortic dilatation was partially eliminated by the removal of an ellipse of aortic wall thus creating a "snugging up" effect upon the annulus. The second patient had a successful repair of the valve; however, potassium citrate arrest was used, and the case terminated unsuccessfully. The third patient had severe aortic stenosis which was corrected by direct vision, but a degree of aortic insufficiency developed and it was necessary to reopen the aorta twice during the procedure to create a bicuspid valve and to suture ivalon sponge to the valve leaflet edges. The operation appeared to correct the lesion to a great degree; however, the patient suddenly went into shock on his third postoperative day and died.

Many surgical attempts have been made to correct mitral regurgitation with most of the techniques directed at the posterior commissure, the usual site of reflux. Mitral regurgitation may result from an absolute loss of valve substance from cicatricial retraction and shrinkage of leaflet tissue or chordae tendineae, or dilatation of the annulus fibrosis. Mitral insufficiency once established tends to progress because of the left ventricular hypertrophy which follows the course of this disease. Constant compensatory left ventricular enlargement causes further stretching of the annulus and produces an ever greater mitral leak. Four patients have undergone mitral annuloplasty performed by placing interrupted mattress sutures of heavy silk above the insufficient area in the annulus fibrosis.

Five patients have undergone direct reconstruction of the mitral valve to cure mitral insufficiency. The mural leaflet is usually the one most damaged, and a plastic prosthesis of ivalon sponge is sutured to the edge of the valve to allow the aortic leaf to coapt with it and thus prevent regurgitation during ventricular systole. There were no deaths in this group of 9 patients and all were improved by the operation.

Pure mitral stenosis has a good chance of being improved by blind finger fracture valvulotomy; however, there are certain cases in which the open cardiotomy is essential for correction of the anatomical defect. They include: patients with grade 4 disease, patients with a history of embolization prior to surgery, patients with left atrial myxomas, patients with apparent re-stenosis after adequate valvulotomy, and the presence of mitral regurgitation along with mitral stenosis. Another group requiring open cardiotomy consists of those patients with multivalvular disease or other intracardiac lesions. Five patients have been operated upon under direct vision for mitral commissurotomy with one operative death. There have been no late deaths and the remaining 4 patients had a successful result.

—John H. Davis, M.D.

Buckling of the Aortic Arch (Pseudocoarctation, Kinking); a Roentgenographic Entity. G. MELVIN STEVENS. *Radiology*, 1958, 70: 67.

BUCKLING or kinking in the contour of the aortic arch usually occurs at the insertion of the ligamentum arteriosum. The abnormal aortic contour produced by such kinking may simulate aortic coarctation, aneurysm, or mediastinal tumor and result in a wrong diagnosis and perhaps unnecessary therapy. A short ligamentum arteriosum fixes the aorta at one point and allows a posterior convexity of the aorta both proximally and distally. Buckling or convexity which occurs in the aorta produces no significant reduction in the aortic lumen.

The posteroanterior chest film nearly always provides the clue to aortic buckling. In this view the shadow of the descending arch is seen with an indentation produced by the anomaly. Occasionally a generous sized aortic knob with an abrupt indentation at the lower pole and a second convexity in the descending arch below this point is seen on the roentgenograms. The left anterior oblique view and the lateral film generally confirm the suspected diagnosis. The abrupt indentation on the posterior and left lateral surface of the aorta at the expected level of the ligamentum arteriosum can be seen. There may be slight dilatation of the distal portion probably because of increased hydrodynamic turbulence produced by the kink. Planograms will usually confirm the diagnosis if it is not definite in the preceding sets of films. In an occasional case angiocardiography is necessary to completely delineate the outline of the buckled aorta.

There are no signs or symptoms associated with this anomaly except for a systolic murmur over the precordium and it is probably secondary to turbulence.

The blood pressure and pulse are usually normal in all extremities with the exception of an occasional case in which the left subclavian artery is obliterated.

The differential diagnosis includes the problem of coarctation of the aorta which is the most difficult to differentiate, aneurysm of the aortic arch, mediastinal tumor, and patent ductus arteriosus.

The evidence suggests that buckling is a congenital defect which is accentuated by the processes of growth and aortic degenerative changes such as tortuosity and dilatation. The patients that have been reported in the literature range in age from 12 to 30 years and this also suggests that it is a congenital anomaly.

When the diagnosis is made by means of the different roentgenographic techniques mentioned, the patient can be reassured that it is not a serious lesion and no therapy is necessary.

Four cases are reported in detail with roentgenograms of the anomaly accompanying the test.

—John H. Davis, M.D.

Visual Repair of Congenital Aortic Stenosis During Hypothermia. HENRY SWAN, ROBERT H. WILKINSON, and S. GILBERT BLOUNT, JR. *J. Thorac. Surg.*, 1958, 35: 139.

CONGENITAL OBSTRUCTION to left ventricular outflow either at the aortic valve or at a subvalvular level occurs in about 5 per cent of patients with congenital heart disease.

The obstruction has been thought to be a rather benign lesion by many observers; however, in recent years an incidence of sudden death in 5 to 8 per cent of these patients has been reported. Eleven patients are presented in this report and all were operated upon using general hypothermia, circulatory arrest,

and open, transaortic plastic revision of their stenotic lesion. Three of the patients had subvalvular obstruction and 8 had valvular stenosis.

Subvalvular stenosis consisted of a ring of firm, fibrous tissue encircling the outflow tract of the left ventricle about 1 to 2 cm. below the valve.

All patients in this series were less than 15 years of age and all except 2 patients had a murmur associated with a classical clinical picture prior to the age of 12. The pathologic condition was observed in the dry field at the time of surgery and leaves no doubt of the congenital etiology of the lesion nor the site of the obstruction.

Symptomatology may be misleading since sudden death may occur with no previous symptoms. Dizzy spells and bouts of syncope are ominous symptoms and may precede sudden death. Congestive failure may occur but it is uncommon and a decreased exercise tolerance may be noted but is frequently difficult to assess in the child.

Physical findings reveal a systolic thrill to the right of the upper sternum transmitted into the neck vessels. Blood pressure and pulse pressure may be normal or there may be a lowered systolic blood pressure and a lowered pulse pressure.

There is a loud, harsh systolic murmur heard by auscultation at the base that is usually of maximum intensity in the first or second intercostal space. Evidence of left ventricular hypertrophy by electrocardiogram is a reliable sign of the severity of the aortic stenosis. Roentgenograms and fluoroscopy may reveal dilatation of the ascending aorta but will not definitely differentiate between subvalvular and valvular obstruction.

Of the 4 patients who had symptoms prior to surgery the symptoms of syncope and dizzy spells have completely disappeared in 2, and the other patients who had a diminution of exercise tolerance have shown improvement in their activity. Of 4 patients who were thought to be asymptomatic prior to surgery, 3 remained so and the other patient has had a great deal more energy than preoperatively.

The systolic thrill which was palpable in all patients prior to operation disappeared following the corrective surgery.

Aortic insufficiency developed in 5 of the patients postoperatively. Two of them had a bicuspid valve, and the insufficiency was considered minimal in 2 and moderately severe in 2. Increases in pulse pressure ranging from 20 to 57 mm. of mercury were observed.

Evidence of regression of left ventricular dilatation and poststenotic dilatation was not found. The electrocardiogram showed no significant regression in the amplitude of the left ventricular complexes nor in the activation time of the left precordial leads. There has been no evidence of increase in heart size by roentgenographic examinations, but the amplitude of the pulsations has increased in all patients.

Pleuritic pain which was diagnosed as a pleural pericardial syndrome developed in one patient and he was treated with steroids without recurrence of the symptoms.

Of the 11 patients 3 died, one several hours after surgery in acute congestive failure due to a damaged mitral valve. The second patient died on the fifth postoperative day of tracheal bronchitis and the third patient died on the twenty-seventh postoperative day of rupture of a pseudoaneurysm at the aortic suture line following a probable infection.

—*John H. Davis, M.D.*

A New Technique in Direct Vision Intra-Aortic Surgery with Special Consideration of Retrograde Coronary Perfusion. N. Okada, H. Ueyama, H. Kinoshita, K. Takenaka, T. Miyamoto, and Others. *Wakayama M. Rep.*, 1957, 3: 167.

A NEW TECHNIQUE in direct vision intra-aortic surgery is introduced which allows entry into the supravalvular aortic portion just exposing the coronary ostia with no danger of coronary air embolism. Retrograde coronary perfusion was used to sustain the myocardium.

A series of experiments were done to assess cardiac function in retrograde coronary perfusion. It was found that the heart rate gradually decreased with the elapse of perfusion time and that atrioventricular block eventually ensued. However, cardiac arrest rarely occurred in those groups of dogs in which 3.0 to 5.0 c.c. blood/kgm./min. were perfused. When rate of flow exceeded 5.0 c.c./kgm./min. of blood or when the pressure in the coronary sinus exceeded 70 cm. of water, then petechiae around the vena cordis magna and myocardial bleeding were frequently noted. Oxygen consumption of the myocardium ran almost parallel to the increasing rate of perfusion up to 5.0 c.c./kgm./min. Beyond this point consumption fell off. Changes in the electrocardiogram were also noted. However, in the groups receiving 3.0 to 5.0 c.c./kgm./min. the heart functioned rhythmically and regularly for more than 30 minutes.

A second series of experiments were done to evaluate the circulatory dynamics in the myocardium during retrograde perfusion. It was found that the outflow quantity of blood from the coronary arteries reached the maximum in the group of 5.0 c.c./kgm./min. and, in addition, most of the blood flowed out via the left coronary artery, while flow from the right coronary artery remained at a minimum. Oxygen consumption was also stated to be highest at that same rate although no figures are presented to support this. It is also stated that oxygen consumption during retrograde perfusion amounted to one third of that of ordinary coronary perfusion.

Finally, applying these principles, together with head-cooling or brain perfusion, aortotomy at the origin of the ascending aorta was done on a series of dogs. Six dogs were operated upon with concomitant head-cooling. Four of these survived more than 3 days. Three dogs were operated upon with concomitant brain perfusion and 2 of these survived. In all cases, coronary sinus pressures were kept below 60 cm. of water. The average rate of perfused blood was 2.3 c.c./kgm./min. The duration of perfusion varied between 13 and 25 minutes. Postoperatively, electrocardiograms and microscopic sections revealed no marked changes or abnormalities.

The authors believe that this method has definite application in direct vision intra-aortic surgery and further offers advantages over existing methods.

—*Arthur M. Simpson, M.D.*

Surgical Applications of Anterior Percutaneous Left Heart Puncture. DAVID G. GREENE, JOHN T. SHARP, GERAINT T. GRIFFITH, IVAN L. BUNNELL, and JOSEPH E. MACMANUS. *Surgery*, 1958, 43: 1.

THE AUTHORS have combined the suprasternal notch approach for left atrial puncture with direct anterior puncture of the left ventricle to permit measurement of pressure gradients across the mitral and aortic valves in 23 patients. A flexible needle, 18 cm. long and 0.8 mm. in outside diameter, is passed from the suprasternal notch posterior to the sternum and anterior to the trachea into the left atrium. It usually pierces the arch of the aorta and frequently the pulmonary artery as well, on its way into the atrium. If so, pressures are measured in each of these structures on the way in and on withdrawal. If not, it is usually a simple matter to reinsert the needle into either of the great vessels if desired. The patient is supine with the neck extended and the head turned to the left. The needle is inserted in the midline and usually reaches the left atrium without difficulty in these patients with valvular heart disease. Once the needle is in place in the left atrium a second one, usually a long thin-walled No. 18 needle with a solid obturator, is inserted into the left ventricle through the anterior chest wall. If the pressure in a systemic artery is measured, the gradients across both the mitral and aortic valves are obtained simultaneously. Alternatively, the gradient across the mitral valve can be measured first, the suprasternal needle then withdrawn to the aorta, and the pressure across the aortic valve measured.

The pressure gradients across the valves are important data but are more significant if simultaneous measurements of blood flow are made. In the 18 patients in whom the pericardium was opened immediately following the procedure, no bleeding point was visualized at the time of surgery. Usually 75 to 100 ml. of bloody pericardial fluid was found. Two patients have had hemoptysis following the procedure.

Of the 5 patients who did not undergo thoracotomy immediately following the procedure, all had some chest pain of minor degree for 1 to 4 days. Two had low-grade fever for the same period of time. Premature ventricular beats have been noted in all patients at the time of piercing the epicardium with the left ventricular needle, but these always stop spontaneously when the tip is advanced further.

In the authors' experience at Buffalo General Hospital the combination of the suprasternal puncture with direct anterior puncture of the left ventricle has been less hazardous than the right posterior approach to the left atrium with catheterization of the left ventricle through the left atrial needle. The percentage of successful measurements of the left ventricular pressure has also been higher and no fluoroscopic guidance is necessary. —*Gilbert S. Campbell, M.D.*

Cardiopericardiopexy: An Experimental Evaluation. ANDREW A. GAGE, KENNETH C. OLSON, and WILLIAM M. CHARDACK. *Ann. Surg.*, 1958, 147: 289.

THE AUTHORS report on the use of their method for the experimental production of coronary thrombosis to evaluate the operation of cardiopericardiopexy. The thrombosis is produced by the insertion of magnesium and aluminum alloy wires into the proximal portions of the left coronary arterial tree. The control group comprised 53 animals; 28 or 53 per cent died from the effect of this occlusion. Of the 25 survivors, 16 had grossly visible infarct at the time of subsequent sacrifice.

In a second group of 67 animals, cardiopericardiopexy was performed and the thrombogenic wires were inserted either at the same time or one month after the poudrage. Under the conditions of these experiments, no beneficial effects of poudrage could be demonstrated in terms of a decrease or delay in mortality, nor did a reduction in incidence of gross infarction occur. The real question is not whether a revascularization procedure can or cannot promote intercoronary or extracoronary collateral, but rather whether it can produce it to a degree greater than that already initiated by the natural stimulus of the disease. —*Alan Thal, M.D.*

ESOPHAGUS AND MEDIASTINUM

Diverticulum of the Thoracic Esophagus (I diverticuli dell' esofago toracico). ENZO CAPPELLINI. *Rass. ital. chir. med.*, 1957, 6: 407.

A SERIES of 10 patients with a diverticulum of the thoracic esophagus is reported. From the analysis of these cases, certain observations are made.

In a certain number of these diverticula, located in the parabronchial area, enlarged lymph nodes were found in and about the diverticulum. The author proposes this as evidence that some diverticula may be inflammatory in origin. The parabronchial diverticula usually found on the anterior lateral surface of the esophagus are small and have a wide base. The tip of the diverticulum is usually adherent to an enlarged lymph node. The parabronchial diverticula differ from the congenital and the traction and pulsion type of diverticula found elsewhere in the esophagus. The chronic intermittent symptomatology produced by these lesions may be due to associated subacute inflammatory reactions. These inflammatory reactions have been seen on endoscopic examination and the process is responsible for perforation and the formation of a bronchoesophageal fistula.

With improved surgical technique, the author believes that all these lesions should be resected and the base should be closed by primary suture. Eight of the 10 cases reported in this article were treated surgically and good results were obtained. In the other 2 cases, multiple diverticula were seen about the duodenum and small intestine.

—*Roland A. Manfredi, M.D.*

Surgical Treatment of Cardiospasm, Achalasia of the Esophagus; Considerations of Aspects of Esophagomyotomy. F. HENRY ELLIS, JR., ARTHUR M. OLSEN, COLIN B. HOLMAN, and CHARLES F. CODE. *J. Am. M. Ass.*, 1958, 166: 29.

ESOPHAGOMYOTOMY has been done at the Mayo Clinic on 55 patients who had achalasia of the esophagus. Postoperative complications occurred in only 2 of these patients, and there were no hospital deaths. Follow-up data were available on all 45 patients

operated on prior to January 1, 1957. The follow-up period ranged up to 7.5 years, the average being 25 months. Of these 45 patients, 96 per cent were improved, with 85 per cent having either good or excellent results.

Postoperative roentgenologic studies were done on 35 of the entire series of 55 patients. A decrease in esophageal caliber was noted in 17 patients. In only one patient could a slight amount of esophageal reflux be demonstrated. No correlation was evident between the caliber of the esophagus after operation and the patient's symptoms.

Studies of esophageal motility were done on 27 patients. These observations demonstrated postoperative abolition of the suprahiatal portion of the lower esophageal sphincter in all instances. The subhiatal portion of the sphincter was partially maintained, which explains the absence of esophageal reflux in these patients.

Details of the surgical technique are important. A thoracic approach is advocated. The myotomy primarily should involve the distal part of the esophagus. The incision should extend onto the stomach only far enough to insure complete severance of the encircling muscles of the lower esophageal sphincter.

Surgical treatment should be offered to those patients who fail to respond to adequate dilation or who have recurrence after dilation. It also should be employed in patients with huge and tortuous esophagi, in those in whom studies of motility demonstrate excessive pressure at the lower esophageal sphincter indicative of muscular hypertrophy, and in those who have associated conditions requiring thoracotomy.

The surgical approach permits deliberate and accurate division of muscle fibers under direct vision. If properly performed, it should have certain advantages over hydrostatic dilation as a primary form of treatment in achalasia of the esophagus.

Evaluation of Operations for Megaesophagus (Cardiospasm). HARLAN D. ROOT. *Surgery*, 1958, 43: 270.

NARROWING OF THE DISTAL 3 to 6 CENTIMETERS of terminal esophagus with concomitant dilatation of the atonic esophagus proximal to this level has been variously called achalasia, cardiospasm, and megaesophagus. Histologic study reveals absence of Auerbach's plexus. This finding was described by Rake in 1927. Megaesophagus needs to be differentiated from benign terminal esophageal stricture and carcinomatous obstruction. Various surgical procedures have been applied to this condition. Sympathectomy and vagotomy have proved unsuccessful and the Wendel procedure carries with it the hazards of severe reflux esophagitis. The same problem applies to the Grøndahl operation.

In an effort to prevent the corrosive effect of acid-peptic juice on the esophageal mucosa, Wangensteen formerly resected the entire acid-secreting area of the stomach together with the strictured portion of the esophagus. Reconstruction was done by esophagoantrostomy together with Ramstedt pylorotomy. Probably the most popular operation applied to this disease is the Heller esophagogastric extramucosal myotomy described in 1913. Hawthorne reported 80 per cent excellent results with this operation. However, in 20 per cent esophagitis and bleeding have been problems. Wangensteen has modified the Heller myotomy by introducing a Foley catheter through a gastrotomy incision and by performing a myotomy over the air-distended Foley bag. This results in the freeing up of a much larger area of mucosa from overlying fibrous and muscle tissue. A Heinecke-Mikulicz pyloroplasty is added.

The results of surgical treatment of 23 patients with megaesophagus are described. Seven patients were treated by resection and esophagoantrostomy. This operation has been associated with two problems, esophagitis and megaloblastic anemia. In a limited experience with 3 patients who were subjected to the Heller procedure, 2 required further operations for recurrent dysphagia. The Wangensteen modification of the Heller procedure was performed on 13 patients in the period from 1952 to 1956. Ten of the 11 patients who underwent a primary operation of this type are alive. Nine have had excellent results with complete relief of symptoms and prompt esophageal emptying.

The authors believe that the balloon-amplified extramucosal myotomy offers the best hope of success in the surgical treatment of megaesophagus.

—*Alan Thal, M.D.*

Primary Reflux Esophagitis and Its Consequences (Primaere Refluxoesophagitis und ihre Folgen). THEO HOFFMANN. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1957, 287: 397.

THIS SUMMARY on primary reflux esophagitis was presented before the German Surgical Society in April, 1957. The author distinguished the primary form, due to primary insufficiency of hiatus or cardia, from the secondary form, which is seen following surgical intervention. The latter was discussed by Franke in a different article.

The mechanisms which normally prevent the occurrence of reflux, such as oblique implantation of the esophagus into the lesser curvature of the stomach (the significance of the angle of His between the esophagus and the fornix of the stomach is pointed out and can be observed in the x-ray), the loop arrangement of the muscle fibers along the lesser curvature, the muscle fibers of the right crus of the diaphragm, and the tonus of the esophagus are briefly discussed. An insufficiency of the cardia may result from involvement of one or several of these mechanisms with subsequent reflux of gastric juice. The author distinguishes an organic and a functional form of cardial insufficiency, sliding hernia being the most important of the organic forms. An entity, described by Lortat-Jacob and Robert as "anomalous development of cardia and fornix," a condition characterized by a highly placed, wide cardia, extending up into the hiatus, absence of the angle of His, and reflux of barium during fluoroscopy, as well as the condition in which secreting gastric mucosa is found in the lower portion of the esophagus are regarded as two other forms of organic cardiac insufficiency. The author elaborates upon the controversial views of Barrett, who regards the latter form as a sliding hernia, and Allison and Johnstone, who consider the condition as ectopic gastric mucosa present in an otherwise normal esophagus.

Pregnancy (because of increased intra-abdominal pressure and vomiting), obesity, gallbladder disease, and obstruction of the gastric outlet (the frequently observed combination of pyloric or duodenal ulcer and peptic esophagitis) are grouped under the caption of functional factors.

The histological changes are grouped into four stages as originally described by Allison. Complications are listed as stricture from scarring of submucous tissues and the muscle layer with shortening of the organ in both the longitudinal and transverse direction, hemorrhage, and rarely, perforation. The three cardinal symptoms are burning retrosternal pain, regurgitation, and dysphagia; in the advanced forms also stenosis, hemorrhage, and perforation. At this stage the diagnosis is obvious but therapy is rather difficult. The problems of early diagnosis do not arise in these advanced forms or the larger sliding hernia, but they appear in the small one with reflux which can only be demonstrated intermittently or sometimes not at all. In these instances the significance of a small pouch above the diaphragm cannot be clarified by radiological means alone. Esophagoscopy is necessary not only to localize the transition of the two mucous membranes but also to exclude an esophagitis. If there are inflammatory changes however, the morbidity of the hernia has been established. In the absence of these changes it is probably wrong to blame the hernia for vague symptoms which may very well be coming from other causes. The author summarizes this complex problem with the formula: the radiological demonstration of an anatomical defect is not essential, only reflux is essential. The morbidity of cardiac insufficiency therefore should rather be regarded as a physiological than an anatomical defect!

—Henry Gans, M.D.

Avoidance of Reflux Esophagitis After Resection of the Cardia (Zur Frage der Vermeidung einer Refluxoesophagitis nach Kardiaresektion). H. FRANKE. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1957, 287: 407.

THE LOSS of the physiologic cardiac valve as a result of surgical removal of the cardia (usually because of cancer) may lead to an uncontrollable reflux of the stomach contents into the esophagus. The acid action of the digestive juices upon the esophageal mucosa causes inflammation, ulceration, bleeding, and spastic and organic stenosis. Conservative treatment of reflux esophagitis has so far remained unsuccessful. Various surgeons have tried to modify their surgical techniques in order to prevent the development of reflux esophagitis. The methods can be classified into four groups: (1) high esophagus resection with preaortic shifting of the esophagus and a high gastroesophagostomy (Valdoni); (2) additional resection of the gastric antrum or fundus in order to prevent production of acid with simultaneous pylorotomy; (3) insertion of an intestinal transplant between the esophagus and the stomach; and (4) plastic surgery with formation of a valve from autogenetic tissue at the gastroesophageal anastomosis.

At the author's clinic a surgical technique of plastic replacement of the cardia (illustrated in 5 diagrams), consisting of the formation of a broad movable flap from the gastric wall which serves as an artificial valve was worked out. The method was applied to 43 patients, 17 of them at the author's clinic. Only one out of 17 patients had reflux-esophageal complaints. The method is recommended by the author.

—Victor R. Jablokow, M.D.

Reconstruction of the Esophagus with Segments of the Colon. WILLIAM E. NEVILLE and GEORGE H. A. CLOWES, JR. *J. Thorac. Surg.*, 1958, 35: 2.

THE AUTHORS report the cases of 28 patients who underwent resection of varying lengths of the esophagus for benign and malignant disease with replacement by segments of the colon, usually proximal. In addition, the authors compared the results of reconstructing the esophagus with implanted colon in dogs with those using esophagogastrostomy. When segments of colon were used, there was no evidence of esophagitis, colitis, or gastritis. Those cases in which the stomach was mobilized to bridge the defect showed complete absence of the mucosa in the distal esophagus above the esophagogastric junction. Ulceration was commonly present.

The technique for esophageal reconstruction using segments of the colon—a somewhat formidable procedure—is described in detail. A branch of the ileocolic vessels and the right colic artery are first tentatively clamped to adjudge the ability of the middle colic artery to maintain the entire transplanted loop. When its ability to do so has been verified, a suitable loop of colon is swung on its intact mesentery and eventually fixed in a tunnel created by blunt dissection in the anterior mediastinum just posterior to the periosteum of the sternum, from the xiphoid to the manubrium. The sternum may be split to widen the thoracic inlet. The cervicoesophagocolonic anastomosis is performed end-to-end. If the distal esophagus is not resected, a catheter inserted into this segment is brought out through a stab wound, creating a mucous fistula. An opening is made on the anterior wall of the stomach and the distal end of the loop of transplanted colon is anastomosed to this. Either a pyloromyotomy or pyloroplasty is done upon the vagectomized stomach. A tube gastrostomy is used to decompress the stomach during the early postoperative period.

Intrathoracic esophageal lesions above the aortic arch are approached through a right thoracotomy and an upper right paramedian incision. While the thoracic team resects the esophagus and inverts the lower end the abdominal team mobilizes the segment of colon from the left side. The colon is delivered into the chest through an opening in the diaphragm anterior to the right lobe of the liver. With intrathoracic lesions below the arch, which are approached through separate left abdominal and thoracic incisions, the transverse colon alone is usually sufficient to substitute for the resected esophagus. The average operating time on all the patients was reported as 3.5 hours. Nothing is given by mouth for at least 10 days following surgery. Beginning on the sixth postoperative day the patient is fed through the gastrostomy tube. Of the 28 patients, 23 had carcinoma (the 7 immediate postoperative deaths occured in these), and 5 had benign disease. Five additional deaths occurred. Experience with the procedure has emphasized the importance

of pyloromyotomy or pyloroplasty and of tube gastrostomy. When the middle colic vessels arise from the superior mesenteric artery the distal half of the colon is used. However, in these cases, the patients complained of nocturnal regurgitation.

—*Sheldon Oscar Burman, M.D.*

Substitution of the Partially Resected Middle Esophagus with a Jejunal Graft. SHIGETSUGU KATSURA, YOSHINOBU ISHIKAWA, and GIICHI OKAYAMA. *Ann. Surg.*, 1958, 147: 146.

ESOPHAGOGASTROSTOMY has been the procedure of choice following resection of the esophagus in most clinics. The follow-up study of 40 patients, 1 to 5 years after esophagogastrostomy with the stomach inside the thorax, revealed that 75 per cent had postoperative complaints. In order to eliminate these unpleasant complications, a new operation was devised which consisted of a jejunal graft with blood vessels transplanted into the esophageal defect after resection of the lesion.

Postoperative studies revealed that the weight loss was less and the gain of weight following surgery was better in the patients undergoing jejunal transplantation. Chemical determinations revealed that the free acid was higher in the patients who had had transplantation, whereas the total acid was similar to that in the patients who had had esophagogastrostomy. The patients who had transplantation also had a better vital capacity, maximum ventilation volume, and oxygen uptake than the patients who underwent esophagogastrostomy.

Although jejunal transplantation has been utilized since 1904 there are several disadvantages to the method so that it has not become popular. Yudin reported that in only 60 of 80 cases was he able to bring the jejunum into the neck due to the short blood supply. Barlow's extensive anatomical studies revealed that anatomy was normal in 78 per cent of the patients. The authors were able to eliminate necrosis of the transplant by the excision of excessive caudal intestine so that adequate circulation was maintained at all times.

The second disadvantage with using the jejunum is said to be that peptic ulcer formation will appear in the graft. Since in this operation the gastric cardia is left intact, it is believed that little or no reflux of gastric content into the jejunal segment would occur and therefore the peptic ulceration is unlikely.

This method of surgery is advocated in order to avoid complications of anastomotic break-down and reflux esophagitis from a destroyed cardiac sphincter, and to preserve active peristalsis into a normal stomach. The cases of 5 patients who underwent the surgical procedure are reported in some detail and the results were satisfactory with a reduction of complications. Indications for the operation in patients with a malignant tumor are discussed.

—*John H. Davis, M.D.*

Lipoma of the Mediastinum (Lipoma del mediastino). FRANCESCO BALDRATI. *Ann. ital. chir.*, 1957, 34: 369.

THE AUTHOR describes in detail a patient with lipoma of the mediastinum and then reviews the pathology, clinical manifestations, and results of therapy for this disease.

The patient was a 49 year old housewife who had a 2 year history of intermittent episodes of nonproductive cough lasting 5 to 6 days which could only be relieved by lying down. Two weeks prior to admission the patient had exertional dyspnea. She had no increase of temperature or nocturnal sweats. The appetite was preserved and there was no associated weight loss. A roentgenogram of the chest revealed a homogeneous opacity in the right costal mediastinal angle on the right about the size of an orange. The physical examination was essentially normal. By means of stratographic studies, the lesion was found to be in the anterior mediastinum. A right posterolateral thoracotomy was done with resection of the fifth rib and an extrapleural tumor mass was identified in the anterior mediastinum. The pleura was incised and a well encapsulated tumor mass was removed. The patient had an uneventful postoperative course. The tumor mass measured about 8 cm. in diameter and on opening the capsule it was found to consist of glistening multiloculated fat tissue. Microscopic examination revealed the tumor mass to be a lipoma.

This rare tumor accounts for approximately 2.8 per cent of all benign mediastinal tumors. Histologically the lesion consists of mature fat tissue which is multiloculated and separated by fibrous connective tissue. Radiologically the tumor mass is identified by its pedunculated contour, relative transparency of the tumor mass, and the increased density that is traced from the periphery to the center of the tumor. The diagnosis can only be made at surgical exploration. These patients should have an exploratory thoracotomy and the tumor mass can usually be completely removed. —*Roland A. Manfredi, M.D.*

MISCELLANEOUS

Hiatus Hernia and Its Complications (Die Hiatushernie und ihre Komplikationen). N. C. TANNER. *Chir. Praxis*, 1957, 1: 431.

THE FOLLOWING three types of hiatus hernia may be differentiated: (1) gastroesophageal hernia (sliding hernia), (2) paraesophageal hernia, and (3) short esophagus.

The paraesophageal hernia, in contrast to the sliding type, has an intact phrenico-esophageal ligament and esophagitis is, therefore, not a necessary consequence. Only as a result of stretching of the ligament will such hernias progress and develop into a sliding type with reflux as a consequence. In patients with hiatal hernia the symptoms are most commonly caused by peptic esophagitis and reflux of gastric content. A burning sensation after eating and on bending or lying on the right side, dysphagia, gnawing epigastric pain, occult or massive bleeding, a dry throat, or globus hystericus are commonly found.

The increasing number of reports concerning this subject indicates the greater awareness of hiatal hernia on the part of diagnosticians. Peptic esophagitis, on the other hand, seems to have increased numerically in recent years, *pari passu* with an increase of ulcer disease in general. Other complications of hiatal hernia listed are mesenteric-axial volvulus of the stomach, strangulation of the hernial sac content, and cardio-

respiratory complications. The association of hiatal hernia with other pathologic entities is of interest. Gastric ulcers should be attacked primarily; in case of supradiaphragmatic penetration, the ulcer must be freed from below and a subtotal gastrectomy performed. In such cases patients will be relieved of their symptoms even without a hernia repair.

In hiatus hernias associated with a duodenal ulcer, heartburn is especially prominent. Because of an associated obstruction or spasm of the duodenum and a simultaneous patency of the cardia, esophagitis is most likely to develop. The procedure of choice in such a situation is a partial gastrectomy, preferably with an emptying enhancing gastrojejunal anastomosis. Hiatus hernia repair is indicated in all patients in good physical condition. The author did not find that pyloroplasty with vagotomy and hiatal hernia repair was satisfactory, and found no place for a gastrojejunostomy per se.

Other conditions associated with hiatus hernia which are listed include: gallbladder affections, carcinoma of the cardia, and pharyngoesophageal and epiphrenic diverticula. Hiatus hernias make recognition of a simultaneous cancer difficult and vice versa. The development of pharyngeal diverticula may be conditioned by spasm occurring in the cricopharyngeal area secondary to the action of gastric acid. The author saw epiphrenic diverticula develop after repair of hiatus hernia; the operative trauma and an increase in intra-abdominal pressure due to closure of the hiatus ring is suggested as a cause.

Many demonstrable hiatal hernias require no therapy and most of them might well be subjected first to medical treatment. Loss of weight, antacids, and the avoidance of recumbency and bending are recommended. Dilatation of a stricture secondary to esophagitis may lead to progressive ascending esophagitis, even though temporary relief is obtained. Such a procedure is of use only in advanced age or as a temporary measure.

Surgical therapy which consists of reduction of the hernia, reconstruction of the esophagogastric angle, and reconstruction of the hiatus is almost always possible, unless stenosis or ulceration of the esophagus exists. Preoperative esophagoscopy to determine the length and mobility of the esophagus is imperative. The abdominal approach is of advantage in identifying and repairing a hiatal herniation; the disappearance of negative pressure after the chest is opened makes the herniation collapse and identification of the lesion difficult. The more tangible argument is the fact that 20 per cent of the patients in this series required correction of additional intra-abdominal pathologic conditions, and that anatomically the hiatus is more in the abdomen than in the thorax. The transthoracic approach is preferred in adipose patients, in cases with a high standing diaphragm, those with stenoses of the esophagus and esophageal fixation, or stenoses suspicious of malignancy.

The author approaches the hiatus through a right paramedian incision and excises the xiphoid process, reserving splitting of the sternum up to the fourth intercostal space for an occasional patient. Freeing of the left suspensory ligament and retraction of the left lobe of the liver and the stomach makes the approach to the esophageal hiatus easy. After incision of the peritoneum and the esophagophrenic ligament the hernial sac can be brought distally and amputated. The esophagus is pulled down with a rubber sling and the esophageal hiatus exposed. Silk sutures in the margins of the hiatus will make subsequent freeing from fat and connective tissue easier. Muscle fibers of the right crus will be encountered on the posterior side anteriorly to the aorta. The posterior portion of the hiatus will oftentimes be visualized only after incision of the hepatogastric ligament. The pleura and pericardium are pushed away by finger dissection so that sutures of the repair will not injure these structures.

Different methods of hiatal hernia repair were applied by the author: (1) anterior or posterior hiatal closure with nonabsorbable mattress sutures, (2) anterior or posterior imbrication of the right hiatal margin over the left, and (3) anterior closure of the hiatus with a continuous suture in addition to approximation of the hiatal margins. In the posterior type of closure, the esophagus goes through a muscular hiatus, whereas in the anterior type one wall of the new hiatus is formed by the vertebral column. The latter seems to be the most secure method of hiatal closure.

In cases of stenosis, shortening of the esophagus, and deep penetrating ulcers, resection is indicated. Proximal subtotal gastrectomy with a Heineke-Mikulicz pyloroplasty is the procedure of choice. The esophagus is transected just proximally to the stenosis as this part is firmer than a normal esophagus, making the anastomosis more secure. When esophageal changes are of lesser severity and in greater risk individuals, partial gastrectomy of the Polya type is the procedure of choice. Despite some theoretical advantages, vagotomy per se presents practical difficulties; the gastric emptying is slowed and this leads to an increased reflux that is prohibitive in the case of esophagitis. In complicated cases the author uses a Roux-Y type esophagojejunostomy with closure of the distal esophageal stump. Left phrenic nerve crush is of use in elderly patients with evidence of mediastinal gastric incarceration; such a procedure decreases the intra-abdominal pressure and tends to reduce the hernial content.

—*Karel B. Absolon, M.D.*

Observations on the Gastroesophageal Junction During Swallowing and Drinking. B. CREAMER and J. W. PIERCE. *Lancet*, Lond., 1957, 2: 1309.

THE AUTHORS attempt to reconcile controversial aspects of the physiology of the lower esophagus. Simultaneous cineradiography and pressure recordings were made in 10 normal subjects during the passage of barium through the gastroesophageal junction. Under the conditions of a single simple act of swallowing, the column of barium was held at the gastroesophageal junction, which opened slowly after a pause. The opening of the junction was accompanied by a fall in pressure in this area. The sphincteric mechanism appears to be situated in the lowest two to three centimeters of the esophagus. This barrier to swallowing does not appear to be a strong one, since the sphincteric action may be obliterated by a sufficiently high intraesophageal pressure proximally.

In a second series of experiments normal subjects were each given the same volume of barium, to be drunk from a cup in a continuous swallowing effort. Under these conditions the barium passed through the junction without delay; contrary to the single simple act of swallowing, the gastroesophageal junction appeared to be opened wide as the barium arrived. The authors believe that these observations indicate that drinking and swallowing are two different physiologic processes and that the gastroesophageal sphincter mechanism is opened earlier in drinking than in simple swallowing. —*Orville F. Grimes, M.D.*

Hypoventilation Syndrome; Physiologic Studies in Selected Cases. E. Osborne Coates, Jr., Geoffrey L. Brinkman, and Frances E. Noe. *Ann. Int. M.*, 1958, 48: 50.

Hypoventilation of the lungs, which results in a lowered arterial oxygen saturation, carbon dioxide retention, and respiratory acidosis, has long been recognized as a prominent feature of diffuse obstructive emphysema. The authors present 4 cases manifesting these findings which demonstrate that hypoventilation may occur in other conditions, both with and without obvious evidence of pulmonary disease. Prompt recognition of this situation is essential since further depression of ventilation, such as may result from the use of narcotics or injudicious use of oxygen, may produce serious consequences. In addition, mental symptoms, presumably related to carbon dioxide retention, which may develop in these individuals, are particularly important because of their potential reversibility and because their cause may be entirely unsuspected.

Arterial blood and ventilation studies were presented for 4 patients with kyphoscoliosis, bilateral pleuritis, radiation fibrosis, and gross obesity. The authors point out that hypoventilation of the lungs leading to pulmonary insufficiency and respiratory acidosis may occur in a variety of conditions which either mechanically restrict thoracic motion or depress the respiratory center. All 4 patients demonstrated varying degrees of alveolar hypoventilation which was accompanied by low arterial oxygen saturation, an elevated carbon dioxide tension, and a low *p*H.

Administration of 100 per cent oxygen to these individuals resulted in a reduction in ventilation in all, and symptoms of confusion and stupor in 3. In one patient an injection of 10 mgm. of morphine sulfate caused further depression of respiration, and stupor ensued which was followed by a picture of shock.

From a practical standpoint, the depth of respiration should serve as a most important guide to ventilation. The clinician should not be misled by good oxygenation of the patient under oxygen therapy, a situation which may be accompanied by severe hypoventilation and respiratory acidosis. Should significant hypoventilation be detected, high concentrations of oxygen should be avoided and narcotics administered with extreme caution. Early tracheotomy is indicated for reduction of dead space and removal of secretions, and the employment of mechanical aids to respiration, such as intermittent positive pressure breathing, respirators, and rocking beds, should be given a thorough trial.

—*M. C. Anderson, M.D.*

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Hernias That Have Forfeited the Right of Domicile; Use of Pneumoperitoneum as an Aid in Their Operative Cure. AMOS R. KOONTZ. *South. M. J.*, 1958, 51: 165.

THE AUTHOR reports his experience with the use of pneumoperitoneum in huge abdominal hernias. This method of procedure was reported by Goni Moreno of Buenos Aires some 18 years ago.

A variety of methods have been employed for inducing the pneumoperitoneum, but the author simply employs a 50 c.c. syringe with a two way stopcock and a large bore needle with a blunt point. It is recommended that a site well away from the hernia, where bowel may be adherent from previous surgical procedures, be selected for the puncture. First air is injected until the patient complains of slight respiratory distress or shoulder pain. Ordinarily in the author's experience 500 to 1,500 c.c. could be injected on the first occasions. Refills are then given at 3 to 5 day intervals until the abdominal cavity is felt to be enlarged sufficiently to accommodate the hernial content. It is important to employ some form of compression of the hernia itself during the time the pneumoperitoneum is kept up to avoid simply enlarging the hernia sac.

Five cases are briefly reported in which this procedure was employed preoperatively and 4 previous cases are mentioned. In one patient pneumonia developed approximately a week after the induction of pneumoperitoneum and this patient died prior to operation in spite of removal of most of the air from the peritoneum.

Of the 8 patients operated upon one developed a small recurrence approximately 2 years after the initial repair; this was repaired immediately and there has been a good result since. The others were followed up for varying lengths of time and have shown good results. —*Robert W. Williams, M.D.*

Late Results of Using Tantalum Gauze in the Repair of Large Hernias. H. C. DALES and J. KYLE. *Surgery*, 1958, 43: 294.

THE AUTHORS report a series of 46 cases of large hernias which were repaired by the implantation of tantalum gauze. Two patients were lost to follow-up, 6 died of unrelated causes, and 40 were followed up for periods of at least 5 years.

Of the 40 who were followed up, 30 had had hernias in the inguinal region, 6 had had the incisional type, and 4 had had paraumbilical hernias.

In the inguinal hernias the results were at least equal to those obtained by methods currently used in repairing hernias of comparable size. The gauze onlay technique was reported unsatisfactory in the repair of large incisional and paraumbilical hernias. Fatigue fractures developed in all gauze implants within 3 years, although the majority of these repairs remained clinically sound.

—*W. Foster Montgomery, M.D.*

GASTROINTESTINAL TRACT

Atresia of the Alimentary Tract in the Newborn. V. CARVALHO PINTO. *J. Internat. Coll. Surgeons*, 1958, 29: 147.

THE AUTHOR reports 197 cases of atresia of the alimentary tract in newborn infants observed in the city of São Paulo, Brazil from 1944 to 1956. All cases were confirmed by operation or autopsy. The distribution of atresia was as follows: esophagus 41, duodenum 7, jejunum 4, ileum 13, colon 1, rectum and anus 131. Operations were performed on 127 infants and there were 28 deaths. In 36 infants there were associated defects. The author discusses in detail the findings, treatment, and results with regard to atresias at various levels from the pharynx to the anus.

The author concludes that because of a better knowledge of the physiopathologic nature of the newborn infant, improved preoperative and postoperative care, controlled anesthesia, and the judicious use of antibiotics the mortality rate has greatly diminished in this type of surgery. He points out the following factors which increase the mortality rate: (1) prematurity; (2) association with other anomalies, some of which are incompatible with life; (3) surgical shock, fluid and electrolyte imbalance, disturbance in nutrition, prolonged anesthesia, or a prolonged operation that lasts beyond the limit the infant can bear; (4) hyperhydration especially in the premature infant with consequent pulmonary edema; (5) aspiration of vomitus as a complication of inadequate decompression of the gastrointestinal tract; (6) a nonfunctioning anastomosis, dehiscence of the sutures, and peritonitis; and (7) late diagnosis and consequent late indication for operation. In general he advocates roentgenologic examination of the newborn without the use of contrast media. Preoperative measures of value are the insertion of a polyethylene catheter into a vein for adequate restoration of water, electrolytes, and proteins; gastrointestinal suction; clearance of the air channels by endoscopic suction; antibiotics; and the use of vitamin K. —*Wayne F. Cameron, M.D.*

Measurement of Red Cell Loss from Gastrointestinal Tract, with Radioactive Chromium. N. C. HUGHES JONES. *Brit. M. J.*, 1958, 1: 493.

WHEN CHROMIUM-LABELED RED CELLS are introduced into the stomach or duodenum, more than 90 per cent of the chromium can be recovered in the feces. In the present investigation 6 anemic patients who were known to be losing red cells in their stools were studied. After the intravenous injection of chromium-labeled red cells, the loss of chromium in the stools was estimated. It was thus possible to discover whether or not the blood loss in the stools accounted for the diminished survival of red cells in the circulation.

Two methods of accomplishing this are described. Blood was collected 10 minutes after injection, the value representing 100 per cent survival. Blood samples were taken at suitable intervals thereafter.

Chromium-labeled cells were introduced into the stomach of 2 patients who were undergoing milk drip therapy for peptic ulcers. The stools were then collected daily until their chromium content had fallen to zero. Patient A excreted 66 per cent and patient B 87 per cent of the administered chromium.

An investigation was made of 2 other patients who were thought not to be losing red cells in the stools. All occult blood tests on the stools were negative and only a minimal amount of chromium was recovered.

In another patient with a diagnosis of cavernous hemangioma of the small gut, chromium investigations showed a red cell loss equivalent to 79 per cent of the red cell mass without any change in the slate-gray color of the stools. The diagnosis was later confirmed by operation.

In a man aged 45 years with a diagnosis of aplastic anemia, chromium investigations showed that the anemia was due to a loss of red cells in the stools rather than to a hemolytic process. In another man aged 37 years with a diagnosis of ulcerative colitis, no blood was macroscopically visible in the stools. Chromium investigations showed the corrected chromium value of the twenty-fourth day to be 50 per cent. Similar results were found in 3 other cases after chromium investigations. The diagnoses in these cases were respectively, hereditary hemorrhagic telangiectasia, the Fanconi type of refractory anemia, and iron deficiency anemia.

Blood loss in the stools, therefore, can be estimated quantitatively by labeling a sample of the subject's red cells with radioactive chromium, reinjecting the cells into the circulation, and subsequently estimating the chromium content of the stools. In the cases cited, the rate of chromium loss from the blood stream was increased, and this amount was almost completely accounted for by the amount of chromium lost in the stools. The amount of chromium lost in the stools did not completely account for the loss of chromium from the blood stream, which indicates that some of the chromium is reabsorbed from the gastrointestinal tract. Thus, the chromium method slightly underestimates the amount of blood lost in the stools.

—*Alfred H. Noehren, M.D.*

Morphology and Pathogenesis of "Congenital Hiatus Hernia" and Thoracic Stomach with Congenitally Shortened Esophagus (Zur Morphologie und Pathogenese der "angeborenen Hiatushernie" und des Thoraxmagens mit kongenital verkuerztem Oesophagus). R. M. KONRAD. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1958, 286: 620.

A THOROUGH REVIEW of the literature and embryology of congenital diaphragmatic abnormalities shows that the terminology is still confused, especially when terms like hernia and prolapse are falsely applied, and the author suggests the following classification:

1. Congenitally short esophagus with thoracic stomach. In these cases the stomach has not normally descended and remains in the region of the cranial celom. It has never been subdiaphragmatic and has a cylindrical, stretched-out shape, while normally the stomach assumes its proper place below the diaphragm when the fetus is about 17 mm. long, at a time when a sudden growth of the esophagus occurs. It is immaterial to wonder whether the shortness of the esophagus or the thoracic persistence of the stomach is the primary factor in this anomaly. There is no hernial sac present, and the diameter of the diaphragmatic hiatus depends on the part of the stomach filling it. Reposition may be very difficult because of the short esophagus.

2a. A malformation of the diaphragmatic hiatus causes upward herniation of the stomach with a true hernial sac. This must have occurred during the second month of fetal life when the normal fusion of the five parts of the cutaneous diaphragm is followed by muscular invasion. This process has been disturbed in cases of this group, and large stretches of a thin membranous diaphragm or abnormal clefts are encountered at operation. The esophagus is only relatively shortened and reposition is usually quite easy.

2b. This group is similar to the preceding one except that the herniation had occurred at an earlier embryonal stage (probably when the embryo was about 11 mm. long) and when there was a physiological lack of space in the abdominal cavity (umbilical "hernia"). The absence of a growth stimulus produces a short esophagus and reposition is difficult.

3. This group comprises cases in which congenital arrest of esophageal growth and/or delayed descensus of the stomach are combined with a malformation of the diaphragm. There is no hernial sac, but the subdiaphragmatic portion of the stomach is covered by peritoneum. Reposition is difficult.

Two illustrative cases each of the first and second group are reported. It is obvious that the differential diagnosis between the groups and the interpretation of the roentgenological findings are very difficult.

—*W. D. Bergman, M.D.*

Gastric Ulcers of the Subcardial Region (Les ulcères gastriques de la région sous-cardiale). FR. MOUTIER, A. CORNET, and P. COURT. *Arch. mal app. digest.*, Par., 1957, 46: 1237.

THE SUBCARDIAL REGION is defined by the authors as located between two horizontal planes, one at the lower level of the cardiac orifice and the other 5 cm. below the first.

Gastric ulcers in this region comprise 10 per cent of all gastric ulcers. Males are more affected than females. Females more than 60 years of age are particularly susceptible to this type of peptic ulceration. Fifty-five per cent of subcardial ulcers are on the lesser curvature, 28 per cent are on the posterior wall, 16 per cent on the anterior wall, and 10 per cent on the greater curvature.

Two-thirds of these ulcers have symptoms typical of gastric ulcers in general and one-third have unusual symptoms. Hematemesis is more frequent than with other gastric ulcers and occurs in one case in 6 at the onset.

In 30 per cent of the cases, pain is atypical in location and may be precordial, in the supraclavicular region, in the left hypocondrium, or along the lumbar or dorsal spine.

Occasionally, the symptoms are more suggestive of esophageal than gastric disease and are characterized by dysphagia and eructation.

In two-thirds of the cases, an ulcer crater can be demonstrated roentgenographically. There is difficulty in the roentgenographic visualization of this region because of the incompressibility of the thoracic cage.

Gastroscopy is indispensable for the diagnosis of ulcers in this region. However, in one case in 10, the gastroscope cannot be introduced into the stomach because of spasm, edema, and inflammatory reaction.

The most unusual feature of ulcers in this location is the amount of edema often present. At times this is so pronounced that the ulcer has the appearance of a neoplasm.

The most common complication of this type of ulcer is hemorrhage. Perforation is rare.

Medical management is effective in half of the cases.

Surgical treatment for the remaining half of the cases varies in the hands of different surgeons. Conventional gastric resection has the disadvantage that the ulcer is often left in place, but is effective in allowing these ulcers to heal if the acid-secreting portion of the stomach is adequately removed.

—Frederick W. Preston, M.D.

The Belcher Gastrectomy for Peptic Ulcer. D. G. MacQueen. *Canad. M. Ass. J.*, 1958, 78: 320.

The author makes a final report covering the first 100 patients who have undergone the Belcher gastrectomy for peptic ulcer and have now been traced from 2.5 to 5.5 years.

The patients ranged in age from 18 to 80 years and there were 3 female patients and 97 male patients in this series. Seventeen of the patients had a gastric ulcer, 80 had a duodenal ulcer, and 3 patients had both gastric and duodenal ulcer.

Four per cent of the patients were underweight 5 pounds or more, 3 per cent of the patients had a dumping syndrome, 4 per cent of the patients showed a rapid gastric emptying time, and 2 per cent of the patients had a recurrence of their ulcer.

Rapid gastric emptying time would seem to be the most important cause of the usual postgastrectomy difficulty, such as dumping, weight loss, and fatigue. That this is not always true is demonstrated by the cases of 8 patients in whom results following surgery were below standard and a short case history of each of these 8 patients is presented.

The 2 patients who had recurrence of their ulcer were psychoneurotic individuals and both responded to transthoracic vagotomy.

A short summary of the operative procedure with illustrations of the type of gastrectomy performed is included.

—John H. Davis, M.D.

Late Results of Nonsystematized Medical Treatment for Peptic Ulcer. E. Iisalo, J. L. Kalliomäki, and A. Kasanen. *Ann. med. int. fenn.*, 1957, 46: 145.

The authors studied the later phases of 303 ulcer cases in which the patients had been under nonsystematic conservative treatment in the period from 1949 to 1951. Of the patients, 14.3 per cent were immediately placed under operative treatment. Thirty-five patients died during the follow-up period. Gastric cancer was present in 2 per cent of the series. Stomach lesions were directly or indirectly responsible for death in 5.6 per cent. Perforation was met with in 2 per cent, gastroduodenal hemorrhages in 8 per cent, and stenosis in 2 per cent.

Recurrences appeared in 42.8 per cent of the follow-up series. The recurrences were evenly distributed throughout the period and gastric and duodenal ulcers seemed to recur with equal incidence. After 5 to 8 years recurrence was not observed in 43.6 per cent but only 18 per cent of the patients were subjectively completely free of symptoms. The length of the disease and of the hospitalization, the medicinal cure given at the hospital, and the occupation of the patients did not effect the recurrent ulcer formation.

—W. Foster Montgomery, M.D.

Heterotopic Pancreatic Tissue Involving the Stomach. Nestor S. Martinez, Carl G. Morlock, Malcolm B. Dockerty, John M. Waugh, and Harry M. Weber. *Ann. Surg.*, 1958, 147: 1.

The term "heterotopic pancreatic tissue," is used by the authors to designate the presence of one or more of the histologic elements identifiable as pancreatic tissue outside the topographic boundaries of the pancreatic gland. The present study was confined to heterotopic pancreatic tissue limited to the gastric wall. It was thought desirable to analyze a relatively large series of cases and to compare the data so obtained with those of other workers in an attempt to establish more clearly the clinical and pathologic significance of the lesion.

A review of the literature disclosed reports of 154 surgical cases of heterotopic pancreatic tissue involving the stomach. This report summarizes the data in 51 cases at the Mayo Clinic; 41 of these cases previously were unreported, bringing the total to 195.

Heterotopic pancreatic tissue rarely is seen in children but it is found in all age groups, being encountered most commonly in the fourth and fifth decades of life. The incidence of the lesion is slightly greater in males than it is in females.

The heterotopic pancreatic tissue was purely an incidental finding in only 32 per cent of these 51 cases. In all other cases, the lesions were associated with clinical signs, or roentgenologic manifestations, or both.

This condition does not have a specific symptom complex. Infrequently, pyloric obstruction is produced by intermittent prolapse of the lesion through the pylorus or by proliferation of the surrounding muscle. Severe gastrointestinal bleeding occasionally occurs because of ulceration of the overlying gastric mucosa.

The presence of heterotopic pancreatic tissue involving the stomach often is revealed by roentgenologic examination. In this series, 74 per cent of the roentgenologic examinations gave positive findings, which were most frequently consistent with those of a polypoid tumor. A roentgenologic diagnosis of heterotopic pancreatic tissue is justified by the demonstration of barium-filled excretory ducts, seen head on or in profile, contained within the boundaries of a small (less than 1.5 cm.) filling defect located in the antrum.

The morphologic characteristics of these lesions vary with the gastric layers predominantly involved. Submucosal heterotopic masses of pancreatic tissue frequently present a nipplelike umbilicated appearance recognizable on gross examination. Most lesions occur within 5 cm. of the pylorus. These lesions are susceptible to the usual pathologic changes, such as myomatous proliferation, ulceration, neoplastic changes, pancreatitis, and formation of cysts.

The clinical course of patients who have heterotopic pancreatic tissue is usually benign, but the presence of symptoms and the roentgenologic demonstration of a lesion justify surgical excision. When the lesion is found incidentally, its removal is indicated to obtain histologic confirmation of its character and to obviate development of clinical manifestations or pathologic changes.

The extremely slight risk of operations in the present era justifies excision of all heterotopic masses of pancreatic tissue involving the stomach. Local excision is the most suitable operation, and subtotal gastric resection is best reserved for patients in whom the true nature of the lesion cannot be established and malignancy is suspected.

Total Resection for Cancer of the Stomach (Die Ergebnisse der totalen Magenresektion beim Magenkrebs). K. NAKAYAMA. *Chirurg*, 1958, 29: 1.

THE MORTALITY RATE in a group of 404 patients who were subjected to total resection of the stomach was 3.3 per cent. The rates reported in the literature vary from 57.3 per cent to 7.1 per cent. Of the various operative methods available the author prefers transplantation of a segment of the jejunum between the esophagus and the duodenum. The appearance of anemia is thus delayed. After 3 years, however, all patients showed a hyperchromic anemia regardless of the operative method that had been used.

The intra-abdominal approach is superior to the thoracoabdominal approach. Although the mortality rate of resection of the stomach and neighboring organs is low, the end results are poor. In general, the late results of total stomach resection are unsatisfactory because of the advanced stage of the cancer.

Total resection should be reserved for advanced cases only. Clinically and experimentally it was shown that leaving a part of the stomach (antrum or cardia) had no ill effects. This experience is in conformity with the findings of other workers (Nissen, Holle, Heinrich). Thus in cancer of the cardia only the affected portion is removed. Even with a low mortality rate, the principle that every cancer of the stomach should be treated by total resection of the organ is unacceptable. Partial resection is never followed by the severe sequelae that are seen in complete removal of the stomach.

—*Sidney Smedresman, M.D.*

Surgical Complications of Meckel's Diverticulum (Chirurgische Komplikationen beim Meckelschen Divertikel). H. KÜHNE. *Zbl. Chir.*, 1958, 83: 17.

A THOROUGH PERUSAL of the modern literature reveals the following facts in regard to Meckel's diverticulum which was first mentioned in 1598. In large autopsy series this anomaly is found in 2 to 3 per cent of the cases. The omphalomesenteric duct of Vitello is normally closed by the ninth week of embryonal life. It may, however, fail to close on either or both sides, thus giving rise to umbilicointestinal fistulas, to incomplete fistulas with "umbilical polyps," to umbilical cysts, or, most often, to Meckel's diverticulum, which shows a fibrous strand on its tip in 10 per cent of the cases, connecting it with the umbilicus or other abdominal organs.

As a rule, the diverticulum protrudes freely into the abdominal cavity and in 80 per cent of the cases it arises close to the ileocecal valve or the appendix. Some diverticula can reach huge proportions, some may arise between mesenteric folds and appear to be retrocecal, and most of them duplicate all layers of the small bowel. Other malformations are often associated. The blood supply to the diverticulum is separate through the abnormal omphalomesenteric artery from the superior mesenteric artery, and if infarction and gangrene of this vessel occurs, the rest of the bowel is not involved. Diverticula are frequently overlooked; in one series of 3,460 laparotomies (Umphries, 1947) only 9 were seen.

The mortality of this lesion is rather high, especially in children, and the following serious complications can arise in a Meckel's diverticulum:

1. Ileus, which occurs in about one quarter of the cases. It was due to a diverticulum in 6 per cent of a series of cases of mechanical bowel obstruction. This occurs most often through invagination into the cecum or through volvulus when the diverticulum is somehow connected with the umbilicus. Fibrous strands to the mesodiverticulum can cause strangulation, and when these strands are severed the blood supply to the diverticulum is usually interrupted so that its removal is mandatory. Lastly, ileus may be due to "knot" formation or direct strangulation of the bowel through a long diverticulum.

2. Ectopic mucosal tissues, resembling the stomach, gallbladder, pancreas, or colon, are found in one-third of the cases. It is believed that they either arise from the primitive digestive tissue of the omphalomesenteric duct or from pluripotential cells of the original entoderm covering the inside of the diverticulum. Since these cells can secrete hydrochloric acid and pepsin, and since the protective function of food, bile, and pancreatic juices is absent, true peptic ulcers occur in 30 per cent of the patients in the diverticulum or its junction with normal intestinal mucosa. The secretion occurs immediately after food intake and causes pain and abnormal spastic contractions of the bowel. Three quarters of these patients with peptic ulcer are less than 15 years old, and perforation of the ulcer occurred in 13.8 per cent of one series, being due to ileus or gangrene in some cases. Diffuse peritonitis is frequently the end result, and the differential diagnosis from acute appendicitis or appendical abscess with perforation may be exceedingly difficult.

3. Diverticulitis, which is comparatively rare because of the size of the abnormal structure and a good blood supply. True neoplasms have been seen fairly often in a diverticulum.

Seven cases of the author are described in detail. Four of the patients were operated upon under the

diagnosis of appendicitis. Bowel obstruction was the surgical indication in another case in which fibrous strands had obstructed the ileum. In one case a peptic ulcer had perforated and produced peritonitis, and in another a large leiomyoma in the diverticulum, of the size of a fist, had suggested a colon tumor with weight loss, bowel disturbances, and tarry stools. The author suggests that one keep this anomaly always in mind and look for it in all patients who undergo laparotomy. It is advisable to remove all Meckel's diverticula when feasible, because of the serious complications and diagnostic problems that can arise. —*W. D. Bergman, M.D.*

Postobstructive Small Bowel Dyskinesia. IRA S. GOLDENBERG and MARK A. HAYES. *Ann. Surg.*, 1958, 147: 26.

THE FUNCTIONAL RECOVERY PHASE of mechanically obstructed small bowel usually follows a definite pattern. Normally a period of ileus lasting from 24 to 72 hours is present after operative relief of the obstruction. Peristalsis then recurs and it is possible to start nutrition. Progression of functional recovery continues with spontaneous bowel evacuation and lack of abnormal signs or symptoms.

Since 1952, there have been 96 patients treated by operation for benign small bowel obstruction at the Yale-New Haven Medical Center, and 9 of these patients have displayed an abnormal postoperative bowel recovery phase. This has been manifested clinically by abdominal distention of some magnitude with normal audible peristalsis and daily bowel evacuations in the presence of normal appetite and oral ingestion of food. Roentgenograms of the abdomen usually revealed distended loops of small bowel resembling mechanical obstruction or ileus. When first noted, this syndrome can be very disturbing to the surgeon who is unable to correlate the diverse factors of distention, normal peristalsis, oral intake of food, bowel evacuation, and the roentgenographic finding, which is consistent with small intestinal obstruction or ileus. This previously undescribed syndrome may be called postoperative small bowel dyskinesia; it apparently is not an uncommon occurrence.

The authors present 3 typical cases and postulate that a temporary dyskinesia is present so that the usually co-ordinated activities of peristalsis, segmentation, and pendulation are out of phase. The material passes through the bowel lumen, but the bowel is not completely cleared of contained gas and feces. Recognition of the self-limited syndrome is important so that long tube intubation of the small bowel, as well as stimulation with drugs, can be avoided. Neither is indicated and each may be harmful.

—*Harold L. Method, M.D.*

Postoperative Morbidity and Mortality in Intestinal Obstruction: Comparative Study of 100 Consecutive Cases from Each of the Past Three Decades. JOHN C. TURNER, JR., WILLIAM H. DEARING, and EDWARD S. JUDD. *Ann. Surg.*, 1958, 147: 33.

THE STRIKING IMPROVEMENT in morbidity and mortality statistics in the field of intestinal obstruction is presumed due to the high degree of refinement in the adjuncts to surgical treatment.

The morbidity and mortality rates in 100 consecutive cases of intestinal obstruction in which surgical treatment was employed at the Mayo Clinic during each of the periods 1929, 1939 and 1940, and 1949 and 1950 are presented in the complete paper. The small intestine was the most common site of obstruction during each of these decades, and bands or adhesions were the most common cause of obstruction in that situation. The most common cause of obstruction of the colon was carcinoma involving the low part of the sigmoid.

Little difference was noted in the mean number of days of hospitalization for each of the three periods. However, the mortality rate decreased strikingly and the number of postoperative complications decreased significantly in the cases drawn from each of the final two decades. Most noteworthy of all was the marked reduction in postoperative peritonitis, bronchopneumonia, and shock in the final group. Possible contributing factors for these changes are as follows: (1) earlier diagnosis and more prompt adequate treatment; (2) correction of electrolyte and fluid imbalances; (3) decompression of the distended intestine by intestinal intubation and suction methods; (4) judicious employment of properly selected antibiotic agents; (5) improvements in anesthesia; (6) special attention to the treatment of associated conditions, such as cardiac failure, pneumonia, peritonitis, anemia, and malnutrition; and (7) earlier surgical intervention in any possible case of strangulating intestinal obstruction and the so-called closed-loop obstruction.

Cecal Ileus; An Undescribed and Helpful Sign in Acute Appendicitis. LESTER M. MAY, FRANCIS E. O'NEILL, and S. W. ALLEN. *Texas J. M.*, 1958, 54: 92.

THE CLINICAL PICTURE of acute appendicitis is at times quite variable, especially in the young and in the aged, and possibly increasingly variable following the introduction of antibiotics with concomitant misguided and dangerous attempts to substitute antibiotic therapy for appendectomy.

The authors call attention to a hitherto undescribed sign in acute appendicitis—localized cecal ileus evident roentgenographically. In the cases described the authors noted, on scout films of the abdomen, a localized distention confined to the cecal area without other significant paralytic ileus. They believe that, when present, the cecal ileus is a more positive diagnostic sign of acute appendicitis than is a localized small bowel ileus. They further postulate that increase in, or persistence of, a cecal ileus on serial roentgenograms in their cases was strong evidence of a gangrenous appendicitis with localized peritonitis.

—*Harold L. Method, M.D.*

Diverticulosis and Diverticulitis; Pathological and Clinical Observations (Ueber die Pathologie und Klinik der Divertikulose und Diverticulitis). H. F. OESTERN and H. W. SCHREIBER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1958, 186: 411.

THIS STUDY concerns 23 patients who were treated at the University Hospital in Bonn. From the etiological standpoint several factors seem to come into play in the development of diverticulosis; one is a primary tissue predisposition, the other factors are functional

derangements, increased mechanical load due to motility changes, and constitutional predisposition.

It is estimated that 10 to 20 per cent of the population beyond 40 years of age suffer from colonic diverticulosis. The average age in this series was 61 years with males being more commonly affected (3:1). The sigmoid area is affected some 20 times more commonly than the rest of the colon with 60 per cent of all diverticula of the gastrointestinal tract localized to this area. Among the 23 cases reported, sigmoid diverticula were found in 17; the descending colon was affected 7 times, the transverse colon three times, and the ascending colon once (these conditions being alone or in association with others). The rectum and cecum are only rarely affected. The explanation of the predisposition of the sigmoid to the development of diverticulosis is the phylogenetically recent development of this portion of the large bowel and its predominantly reservoir function. Singer suggests the so-called "sphincter tertius" as a factor.

In addition to the commonly seen complete diverticula along the taeniae and the mesentery, smaller mucosal canals are observed. These canals are surrounded by hypertrophic muscle and form T-shaped structures. In these formations the lumen is obstructed by necrotic epithelium, mucus, and exudate and small abscesses or scarring are commonly identifiable.

The highest incidence of diverticulitis is in the sigmoid. Acute and chronic processes may be identified in 10 to 30 per cent of the cases of diverticulosis. In acute cases more or less localized peritonitis may be identified. Perforation develops in some 18 per cent of cases. The etiology of acute diverticulitis seems to be a coprostatic necrosis with associated bacterial, chemical, and toxic factors. Torsion of diverticula or perforation secondary to trauma are less common complications.

In chronic diverticulitis two forms are differentiated. In one form a circular infiltration of the intestinal wall is found; the initial acute phase is followed by a fibrous hyalinizing proliferative phase which leads to sclerosis of the submucosa, muscularis, and subserosa. The second form consists of an eccentric tumorous proliferation toward the mesenteric border of the intestine. Surrounding intestinal loops, the bladder, and the abdominal wall may become involved. Multiple small abscesses, fistulas, granulomatous round cell infiltrates, and islands of foreign body reaction with eosinophils are observed. Secondary and late perforations are rare in this form of diverticulitis but erosive bleeding is common; it occurred in one-fourth of the cases reported. Thrombophlebitis of the mesentery with secondary pyemia and septicemia is a serious complication.

Clinically, diverticulosis often is discovered as a coincidental finding. It should be considered in patients with unexplained abdominal complaints, irregular movements, obstipation, diarrhea, gaseousness, and in anorexic, pale, undernourished individuals. Acute diverticulitis is diagnosed clinically more frequently than pathologically, as an acute episode may complicate a chronic process. The term "left-sided appendicitis" summarizes the clinical findings adequately. Vomiting initially, palpatory pain, muscle spasm, temperature elevation, and leucocytosis are characteristic. The authors did not observe any cases of truly acute diverticulitis, but 3 of their patients had acute exacerbations of a chronic process. In cases with a wide sigmoid loop which reached into the right lower quadrant differentiation from true appendicitis was impossible.

X-ray diagnosis will substantiate a clinical impression. Some workers have spoken of a significant danger of perforation during barium enema or proctoscopy but practical experience does not substantiate these fears.

A dangerous form of acute diverticulitis is generalized peritonitis due to a perforated diverticulum. Such cases may have to be treated just by drainage but if the area of perforation is visualized the perforation should be closed or the diverticulum resected. The authors do not mention colostomy as a therapeutic method in these patients. In cases of a localized peritonitis with a larger abscess, the latter should be drained and a colostomy established proximally. In the rest of the cases conservative expectant therapy under careful follow-up is recommended.

In the chronic form pain in the left lower quadrant was observed in 12 patients of this series, obstipation in 11, abdominal pain in 9, loss of weight in 7, blood in the stool in 5, mucus in 4, tenesmus in 4, bladder difficulty in 3, and distention once.

As to differential diagnosis, Mognihan well expressed the situation as "cancer mimicry"; the pain on palpation of a diverticular tumor is more common than in the case of cancer and the benign lesion is less mobile. Despite large palpable lesions the general physical well-being is maintained and cachexia is not observed if the tumor is benign. Subfebrile temperatures, leucocytosis, and an increased sedimentation rate point to the inflammatory nature. X-ray differentiation of chronic diverticulitis from cancer may be difficult. The greater length of the benign lesion and a funnel-shaped rather than sharp delineation of the normal from the diverticular bowel are characteristic. Filling of an abscess in a tumor, or a toothed outline of the bowel in the sigmoid area makes diverticulitis a probable diagnosis.

Intestinal obstruction is the most important complication and this was found in 7 cases intermittently and in 2 cases as complete obstruction. Other complications include fistula formation into the bladder, intestine, and abdominal wall.

There is unanimity on surgical treatment of diverticular complications; an intestinal obstruction or a colovesical fistula will require a colostomy on an emergency basis. Conservative treatment is admissible only in localized forms of the disease. The authors mention the recent trend to more aggressive resectional therapy in many cases. An anastomosis should be established in surrounding healthy tissue and colostomy plus a staged procedure will therefore be the procedure of choice, the resection following 6 months after the colostomy.

The authors consider the Heinecke-Mickulicz exenteration of the diverticular lesion of great advantage whenever it is possible to establish it; unfortunately, this procedure is not often applicable because of difficulty with mobilization.

Of the 23 patients discussed 15 had the localized, circular form of diverticulitis which was treated conservatively with relief of symptoms. One of these patients died following an operation for rectal cancer. The authors obtained good results in 8 patients, 2 of whom had a primary resection, 4 a Mickulicz procedure, and 2 a preliminary colostomy.

—Karel B. Absolon, M.D.

Rationale of Vagotomy and Pyloroplasty in Management of Bleeding Duodenal Ulcer. GORDON KNIGHT SMITH and JACK MATTHEWS FARRIS. *J. Am. M. Ass.*, 1958, 166: 878.

IN 150 patients with duodenal ulcer, the authors have combined vagotomy with limited subtotal gastrectomy, gastroenterostomy, or pyloroplasty. They record over 90 per cent excellent results with no instances of marginal ulcer and no deaths. The follow-up period has been over 5 years for 50 per cent of these patients. The rationale of the authors' procedure is vagotomy to control the cephalic stimulus to gastric hypersecretion and a drainage procedure to control antral stimulation. Pyloroplasty in which normal continuity of the gastrointestinal tract is preserved is presented as the operation of choice. Initially, this procedure was not applied to cases of acute bleeding but it has now been extended to acute hemorrhage. At operation, gastroduodenotomy is done initially with suture-ligation of the bleeding ulcer bed. A one-layer Heineke-Mikulicz pyloroplasty is completed and a complete and careful vagotomy performed, with adequate mobilization of the esophagus to insure clear visualization of the local anatomy. Postoperatively a catheter gastrostomy is used temporarily.

Twenty-one patients have been operated upon for massive hemorrhage over the past 3 years. In this group there has been no postoperative bleeding, no recurrence of ulcer to date, and no deaths. The authors also recommend early operation for the initial hemorrhage from a duodenal ulcer regardless of the patient's age or prior history.

—Hermes C. Grillo, M.D.

Long Term Results of Vagotomy and Gastroenterostomy in Chronic Duodenal Ulceration. HAROLD BURGE and E. J. PICK. *Brit. M. J.*, 1958, 1: 613.

THE AUTHORS report 301 cases from the Dan Mason Research Foundation, West London Hospital Medical School. They report 7 to 9 year follow-ups of patients who had vagotomy and gastroenterostomy. The review was made by questionnaire and personal interview. In assessing the postoperative picture with regard to symptoms the authors have chosen to limit themselves to a series of 130 cases which they have personally investigated.

The authors report 100 cases of vagotomy and gastroenterostomy without a death and this coincides with other reported good results. The recurrence rate, as shown by perforation, hemorrhage, or operation, was found to be 4.25 per cent. Weight has been gained by 14 per cent of the patients, has remained steady in 75 per cent, and has been lost in 11 per cent. Fifty patients were studied for evidence of postoperative anemia and all patients maintained a good hemoglobin level. Most of the patients were occupied in heavy work and in no case was the ability to undertake it reduced. Thirty per cent of the patients complained of diarrhea or loose stools and there was a 16 per cent incidence of dumping. Bilious regurgitation was found in 13 per cent of cases.

The authors compare these findings with those following gastrectomy. They state that in good hands the mortality from gastrectomy is from 1 to 2 per cent, but they believe that the over-all mortality in England is higher. Thus the mortality rate would favor the vagotomy operation. The proved recurrence rate of ulceration after partial gastrectomy probably varies from 2 to 6 per cent, making the 4.25 per cent of vagotomy acceptable. Following gastrectomy there was a 47 per cent decrease in weight which would not seem favorable. Postoperative anemia was found to be relatively common in patients who had had gastrectomy. The authors state that the physical condition following vagotomy is better than that following gastrectomy. Twenty per cent of the patients who had had gastrectomy reported they had diarrhea or loose bowel movements. The authors give no statistics regarding postcibal symptoms, but state that the incidence and severity of the dumping syndrome is very great.

The authors then state: "We believe that all workers who have studied these two operations will agree that given no increased incidence of recurrent ulceration vagotomy and gastroenterostomy is a better operation than gastrectomy." The authors believe that one of the difficulties previously encountered with the vagotomy and gastroenterostomy operation is that incomplete nerve section has been done. Therefore, if complete vagectomy is carried out, the results of this operation should be as good as gastrectomy. The authors' position is that this operation should be carried out for duodenal ulcer particularly in women and elderly men.

—Peter Dineen, M.D.

Incomplete Surgical Removal of the Appendix: Its Complications. J. MAJOR GREENE, DAVID PECKLER, WILLIAM SCHUMER, and EARLE I. GREENE. *J. Internat. Coll. Surgeons*, 1958, 29: 141.

INCOMPLETE REMOVAL of the appendix during the course of an appendectomy may result in such complications as recurrent acute appendicitis, perforation with peritonitis, and perforation with the formation of an abscess.

Incomplete removal of the appendix usually results from failure of the surgeon to locate the exact juncture point of the appendix with the cecum. An abnormally situated ileocecal fold or an old inflammatory process that conceals the proximal portion of the appendix at its juncture with the cecum may result in the leaving of as much as three-fourths of an inch of appendical stump.

Three cases are reported in detail in which this complication was encountered.

Case 1. A 27 year old woman was seen, 12 years after an appendectomy, because of abdominal pain. A diagnosis was not made but subsequent gastrointestinal studies revealed a normal gastrointestinal tract except for an appendical stump which was partially visualized. Eight months after this attack the

patient had another attack of pain in the right lower quadrant. A diagnosis of acute appendicitis was made and verified by pathologic examination of the tissue removed at the time of surgery. The patient has had no similar attack of pain in the 8 years since the second appendectomy.

Case 2. A 42 year old woman was admitted to the hospital with the signs and symptoms of an acute abdominal condition. A diagnosis of peritonitis, etiology unknown, was made and an exploratory laparotomy was carried out. A perforation in the distal portion of the cecum was discovered, and the perforation proved to be in the stump of the appendix. The stump had not been completely removed nor inverted at the time of her previous appendectomy which had been performed 16 years prior to this episode.

Case 3. A 53 year old woman was seen because of an enlarging tender mass in the right lower quadrant of the abdomen. An appendectomy had been done 20 years prior to this admission. The mass was slightly movable and was believed to be intra-abdominal, probably a carcinoma of the cecum. At the time of laparotomy a large mass was found involving the cecum, a portion of the ascending colon, and the terminal ileum. The mass was removed and an ileotransverse colostomy was carried out. Pathologic examination of the material following surgery demonstrated an inflamed appendix with perforation of the tip of the remaining stump surrounded by an abscess.

The three cases are presented in detail as to their history, hospital examination and studies, including x-rays and the eventual outcome in each.

—*John H. Davis, M.D.*

Impromptu Bowel Cleansing and Sterilization. MARVIN L. GLIEDMAN, ROALD N. GRANT, BETTY L. VESTAL, and KARL E. KARLSON. *Surgery*, 1958, 43: 282.

THIS STUDY was undertaken to evaluate the feasibility and limitations of colonic sterilization during laparotomy. The merits of 0.9 per cent saline solution, 1 per cent neomycin, and 0.4 per cent clorpactin were appraised in their ability to reduce immediately the bacterial, yeast, and mold counts in unprepared canine colons. Irrigation of the colon with these solutions was accomplished by perfusion through a No. 13 gauge needle in the cecum and draining the effluent through a No. 38 colonic tube in the rectum. Both 1 per cent neomycin and 0.4 per cent clorpactin very rapidly reduced bacterial counts to sterile or trace levels. However, yeast and mold response to neomycin was erratic and unpredictable. Following 200 c.c. of clorpactin, the wash-fluid from the bowel was routinely sterile for yeast and mold as well as bacteria. In spite of the sterile wash-fluid, biopsy of the mucosa was uniformly positive except in one instance.

—*Alan Thal, M.D.*

Surgical Management of Chronic Ulcerative Colitis. WILLIAM S. CARPENTER and PAUL J. CONNOLLY. *Arch. Surg.*, 1958, 76: 13.

MEDICAL TREATMENT of chronic ulcerative colitis is effective in controlling the disease in 50 to 80 per cent of patients. In the remainder, some form of surgery is necessary to eradicate the disease. The authors discuss the cases of 33 patients who were operated upon for this condition during a 7 year period. The youngest patient was 12 years of age and the oldest 65. Sixty-one per cent were less than 40 years of age.

The indications for surgery in this group are no different from those previously described. About 5 per cent of the patients are in the acute fulminating stage of the disease and in this group every effort should be made to induce a remission by medical means if possible.

The most common reason for the referral of a patient for operation is the failure of medical means to control the diarrhea. These patients are usually in one of two groups. In one, the disease is characterized by recurrent episodes which become more frequent and prolonged and in the other the disease is continuous. Twenty-five of the 33 cases in this series fell into this classification.

Four of the patients in this group had massive bleeding and in 2, this was the symptom which necessitated operation.

Malignant degeneration has been mentioned as an indication for operation in ulcerative colitis and it has been variously estimated as occurring in from 10 to 30 per cent of the patients who have the disease more than 10 years. Eight of the patients in this series had ulcerative colitis for more than 10 years and one of these was found to have carcinoma. The mortality rate from carcinoma of the colon secondary to ulcerative colitis has been reported to be as high as 93 per cent. In the single case in this series, the patient was found to have diffuse abdominal carcinomatosis and died 2 weeks after operation.

Perforation or obstruction may be an indication for operation in this condition. However, neither was present in this series.

Early in the series, it was hoped that ileostomy alone would suffice to relieve the symptoms of the disease. However, it was found that colectomy was necessary eventually and now a one-stage procedure is advocated. The last 12 patients in this series have had a one-stage proctocolectomy. In 2 of the patients in this series, the disease was found to be segmental in character and it was possible to do an ileoproctostomy.

Of the 33 patients operated upon, there were 3 deaths. One was the patient with carcinomatosis and the other 2 were operated upon during a fulminating stage of the disease.

There were 11 patients in whom one or more complications developed. These complications included pelvic abscess, hemorrhage from the perineal wound, intestinal obstruction, retraction of the distal colon which had been brought out through a left lower quadrant stab wound, urinary retention, perineal abscess, gastric dilatation, thrombophlebitis, electrolyte imbalance, and failure of healing of the perineal wound.

The most troublesome complications have involved the ileostomy. The problem of prolapse is controlled by suturing the cut edge of the ileal mesentery to the peritoneum and suturing the mesentery along the edge of the bowel to the parietal peritoneum for a distance of 4 to 5 inches.

The major difficulty with the ileostomy has been stenosis. Stenosis had developed in 10 of the patients with ileostomy. Of these, 7 have needed a single re-

vision and the remainder have needed from 2 to 5 revisions.

A bag which can be cemented to the skin is recommended.

Despite the ileostomy problems, the end result of operation for ulcerative colitis is almost uniformly good. These patients are characterized by weight gain, better social adjustment, and an improved mental attitude. —*John J. Bergan, M.D.*

Multiple Carcinomas of the Large Intestine: A Review of the Literature and a Study of 261 Cases. CHARLES G. MOERTEL, J. ARNOLD BARGEN, and MALCOLM B. DOCKERTY. *Gastroenterology*, 1958, 34: 85.

THE LITERATURE concerning multiple colonic carcinomas has been reviewed and the authors have presented data on 261 cases in which multiple carcinomas of the colon were seen at the Mayo Clinic from January 1, 1944 through December 31, 1953. This represents a known rate of occurrence of 4.3 per cent. The concept of carcinoma of the colon as a multicentric lesion has been discussed. A marked tendency to multiplicity has been observed in carcinoma of the colon associated with multiple polyposis or with chronic ulcerative colitis. The authors also have obtained some evidence of hereditary factors in predisposition to malignant disease of the colon. When the diagnosis of a malignant lesion of the colon or rectum has been made, the entire large bowel must be considered a potential source of malignant disease. An integral part of the management of carcinoma of the large bowel must be constant vigilance to ensure early diagnosis and adequate treatment of both simultaneous and interval lesions.

To ensure early and adequate treatment of second lesions in patients with known colonic carcinoma, the following program is suggested as representing the minimal requirements for management of all patients who have carcinoma of the large bowel:

1. The entire colon and rectum must be carefully examined at the time of treatment of the initial lesion. This examination should include direct visualization of as much of the mucosa as is practicable.

2. Multiple polyposis and carcinoma complicating chronic ulcerative colitis should be positive indications for total colectomy.

3. All polyps should be promptly treated by resection or fulguration as soon as possible after their discovery.

4. The physician must assume the responsibility for impressing the patient with the necessity for frequent and regular follow-up examinations. These examinations must be done at no longer than 1 year intervals for at least 5 years after treatment of the initial lesion and preferably at yearly intervals thereafter.

5. A minimal follow-up examination must include a proctoscopic examination as well as a careful roentgenologic examination of the colon.

The Treatment of Complete Prolapse of the Rectum by the Roscoe Graham Operation. J. C. GOLIGHER. *Brit. J. Surg.*, 1958, 45: 323.

A CAREFUL FOLLOW-UP STUDY of 150 patients who had undergone rectosigmoidectomy for complete prolapse of the rectum revealed that 60 per cent had a recurrence of their prolapse and 46 per cent were incontinent. Since rectosigmoidectomy is an attempt to correct the deformity by shortening the distal large bowel it does nothing to eliminate the underlying causes of the condition which are considered to be: (1) an abnormally deep rectovaginal or rectovesical pouch of peritoneum, (2) a lax and atonic condition of the musculature of the pelvic floor and anal canal, and (3) lack of the normal fixation of the rectum to its bed.

The author has devised an operation which is a modification of the operation by Roscoe Graham. The operation consists of complete dissection of the rectal segment except for the posterior rectal vessels, exposure of the puborectalis muscles and suture of these muscles about the rectum in order to provide a sling, and lastly obliteration of the pouch of Douglas at the time of peritoneal suture. The operation is done through a transabdominal approach with the patient in the lithotomy Trendelenburg position.

Twenty-three patients have been operated upon utilizing this procedure and they have ranged in age from 17 to 82 years. There were no operative deaths. The 23 patients have been carefully re-examined at intervals and the follow-up periods now range from 1 to 7 years. The results have been uniformly excellent with no suggestion of a recurrence of the prolapse in any patient.

The state of the anal sphincters in follow-up studies has been less gratifying. In general when the sphincter tone was good prior to surgery it has continued so, but the patients who preoperatively had an atonic weak sphincter that was capable of little or no voluntary contraction are still in much the same condition.

The subjective results are not as satisfying as the objective results. Fifteen patients consider that they are completely continent under all conditions and have no complaints. Four patients are usually continent but are troubled by frequent small bowel movements. They do not wear a perineal pad except during a period of diarrhea and they are usually continent for flatus. Four patients are frankly incontinent. These patients wear a perineal pad continually. The 8 patients in the latter groups were patients who had grossly subnormal sphincter tone prior to surgery. There was no residual urinary dysfunction in any of the 23 patients. One of the male patients reported impairment of orgasm and failure of ejaculation presumably due to damage of the presacral nerve.

The technique of the operation is described in detail and is accompanied by excellent photographs of the procedure. —*John H. Davis, M.D.*

Anteriorly Placed Rectal Opening in the Perineum (Ectopic Anus); a Report of 30 Cases. ALEXANDER H. BILL, JR., R. J. JOHNSON, and RALPH A. FOSTER. *Ann. Surg.*, 1958, 147: 173.

ATTENTION is called to the congenital anteriorly placed rectal opening in the perineum. This is separated from other instances of imperforate anus with rectoperineal fistula because very often the defect is not recognized initially. Thirty cases are described. In most, the chief complaint was moderate to severe constipation, and the average age at which the patients

were brought for treatment was 6 months. The distribution was approximately equal in males and females. In most cases the anal dimple could be recognized by stimulating puckering of the external sphincter by pin prick.

When these cases are studied in conjunction with other cases of imperforate anus with communications between the rectum and the bladder, urethra, or vagina, and with consideration of the embryology of the region, the concept is suggested that the rectal opening migrates downward from the cloacal stage to the perineum and then backward across the perineum to its normal position. The entity described could result from arrest of this migratory process just short of the normal position.

Surgical repair was accomplished in these cases by transplantation of the rectal mucosa backward to the normal anal dimple. When the anal opening was just barely in front of the external sphincter or partly between its fibers, the procedure could be simplified considerably. The authors have had good results in 75 per cent of their cases, although most patients have required digital dilatation.

—Hermes C. Grillo, M.D.

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

Surgical Treatment of Portal Hypertension. CHARLES G. CHILD, III and ARTHUR J. DONOVAN. *Am. J. Digest. Dis.*, 1958, 3: 114.

AFTER REVIEWING the mechanisms of portal hypertension and the causes of hemorrhage from esophageal varices, the authors discuss the various regimens of therapy that have been applied. Surgery in portal hypertension deals almost entirely with hemorrhage from varices. In an occasional patient with well compensated liver disease who has uncontrollable ascites, a portacaval shunt may yield improvement. At this time portacaval venous decompression can be recommended to patients with cirrhosis or portal venous obstruction who have had one or more episodes of hemorrhage from varices.

Although too strict criteria of satisfactory liver function will exclude some suitable patients from consideration, there is general agreement that no such surgery should be performed on patients with severely deteriorated livers in whom the esophageal hemorrhage is merely an event in a fatally terminating disease. Care should be taken to find those 10 or 15 per cent of patients whose hemorrhage is from peptic ulcers or gastritis rather than from varices. The Blakemore-Sengstaken tube will assist in that differential diagnosis. The data are inconclusive which purport to demonstrate that the risks for fatal hemorrhage in patients with cirrhosis and varices who have not yet had hemorrhage exceed the mortality risk of a prophylactic portacaval anastomosis. In the authors' series, that is around 10 per cent.

In some patients, after control of hemorrhage by balloon tamponade, the shunting procedure may be deferred to a time best suited for the diseased liver. However, in others recurrence of hemorrhage will require that the varices be sutured. In another group the recurrent hemorrhage will be easily controlled by reapplication of the tamponading balloon, and before serious impairment of the liver occurs a shunt may be performed while the tamponade is in force.

The authors prefer an end-to-side portal vein to inferior vena cava anastomosis. In their series of 74 cases, no patient who has survived the operation has had recurrent hemorrhage. The shunt does not lead to deterioration of the liver. About 15 per cent of the patients have had difficulties after operation, described as the syndrome of meat intoxication, and usually thought to be due to ammonia of intestinal origin which bypassed the liver. However, in two-thirds of these patients the difficulty was very mild and transient. *—Leonard D. Rosenman, M.D.*

Experiences with Laparoscopy in Diseases of the Liver and Gallbladder (Erfahrungen mit der Laparoskopie bei Leber- und Gallenkrankheiten). J. BEYREDER and H. RIEDER. *Wien. med. Wschr.*, 1958, 108: 226.

WITH THE MARKED INCREASE of liver diseases since the war, diagnostic and biochemical methods have been greatly improved, but liver biopsy and direct inspection of the liver are often indispensable in order to arrive at a diagnosis. The main advantage of laparoscopy, which has been greatly developed since Kelling first described it in 1901, is that the dangers of blind puncture can be avoided, large areas of the liver can be inspected, and isolated lesions can be biopsied under direct vision.

The authors looked back on 750 laparoscopies with 493 aimed biopsies. Diaphragmatic hernias, acute intra-abdominal infections, circulatory decompensation, and blood dyscrasias were absolute contraindications. Vitamin K is given in the presence of jaundice. After premedication, ascites is drained, if present; pneumoperitoneum is carried out, and a trocar is introduced under local anesthesia, to the left of the midline near the umbilicus. The preferential site for liver biopsy is the right lobe between the gallbladder and the ligamentum teres, and the puncture wound is carefully observed until a stable clot is present.

Complications most frequently arise from severe adhesions, rarely from air injected into the omentum. Subperitoneal and cutaneous emphysema occurred in 5 cases each; severe bleeding after biopsy and trocar injury to the liver in 2 cases each. Small bowel injury occurred in 3 cases and healed spontaneously in all of them. One patient with generalized metastatic disease died of peritonitis from biliary fistula. It appears from the figures that liver function tests were negative in one-third of the patients with diffuse diseases of the liver, comprising 92 cases of acute and 60 of chronic hepatitis, and in more than one-half with other lesions such as mechanical icterus, localized lesions, and neoplasms. The value of the procedure was self-evident in this group when the laboratory examination failed; in addition, it was usually impossible to correlate the laboratory findings with the severity of the disease present or to determine the progress, arrest, or regression of the disease process.

Laparoscopy is indispensable in the differential diagnosis of virus hepatitis and one of its subforms—cholangiohepatitis, which occurred in 42 of 134 cases. It has an important place in the distinction between parenchymatous and mechanical jaundice, and it is

difficult to make the diagnosis of anicteric hepatitis without visualization of the liver. If cholangitis or cholangiolitis is recognized early by laparoscopy, late cirrhosis can be avoided. A fatty liver can be diagnosed only by histological examination. Apart from the obvious advantage of revealing unsuspected neoplasms, echinococcus cysts, hemangiomas, and thromboses of the portal or splenic veins, the procedure can aid in clarifying portal congestion, the status of the collateral circulation, and etiological factors in liver cirrhosis. Occasionally, rare entities like Boeck's sarcoid, lymphogranulomatosis, osteomyosclerosis, and hemochromatosis can be diagnosed, or adhesions, ovarian tumors, and other intra-abdominal disease may be found. In the presence of ascites, laparoscopy should be a routine procedure. If more frequently employed it will aid greatly in our understanding of the pathology of the abdomen.

—*W. D. Bergman, M.D.*

The Cholecystogram and the Clinician. J. DUDFIELD ROSE. *Brit. M. J.*, 1958, 2: 360.

OF 137 PATIENTS admitted to the Newcastle General Hospital or the Royal Victoria Infirmary, 40 had a normal "classical" cholecystogram, but serial cholecystography showed a dyskinesia which was subsequently proved at operation in each case.

Briefly, the method used for serial cholecystography is to take both anteroposterior and lateral roentgenograms 14 hours after the ingestion of a single dose of iopanoic acid (telepaque) and then every 10 minutes after a fatty meal for 80 minutes. From these roentgenograms the volume of the gallbladder is computed and two curves are drawn: the curve of the volumes, and the curve of the angle or erection of the gallbladder, which is the angle between the long axis of the gallbladder and that of the spinal column in the lateral view. This angle is important, since any increase of the angle has the effect of reducing the apparent length of the gallbladder shadow in the anteroposterior view and must be taken into account when calculating the volume. Normally it is between 5 and 15 degrees, and it depends on two factors: (1) the tone and force of contraction of the gallbladder, and (2) the resistance to its evacuation.

After the ingestion of a fatty meal the gallbladder shadow normally becomes smaller and in the anteroposterior view moves proximally and rotates externally. In the lateral view the shadow appears to rotate so that the long axis becomes more vertical and the angle of erection increases from 5 to 15 degrees. The normal volume of the gallbladder is between 25 and 30 ml., and in normal circumstances decreases by 70 per cent in the first 30 minutes after the fatty meal. In abnormal states the gallbladder may evacuate insufficiently (hypokinesia) or it may evacuate excessively (hyperkinesia). The gallbladder tone, as indicated by the angle of erection, may be less than normal (hypotonic) or greater than normal (hypertonic). When there is obstruction to evacuation the curve of the angle of erection contrasts strongly with that of evacuation. The evacuation is insufficient while the angle of erection increases. If, however, the angle of erection is initially low and fails to increase during the test, then the gallbladder is atonic. The gallbladder may evacuate excessively and yet have a small angle of erection which does not increase during the test. This occurs when the sphincters are particularly atonic and the normal stimulus to evacuate, which is hormonal, brings about an excessive response.

The author cites 20 cases of patients with subnormal gallbladder emptying due to gallbladder muscle atony. Of these 20 patients, 13 had no associated morphological abnormality, and only a right splanchnicectomy was performed. Four patients had gallstones, and in addition to the right splanchnicectomy a cholecystectomy was performed in 3 and a cholecystlithotomy in one. Two patients had associated chronic cholecystitis and one had cholesterosis; cholecystectomy and right splanchnicectomy were also performed on these patients. Of the results, 17 were good and 3 were unsatisfactory.

The gallbladder may fail to empty normally because of an obstruction at the neck of the gallbladder or cystic duct due to spasm of the sphincter of Lütkens or to some organic abnormality. There were 14 such cases, and 7 were due to spasm of the sphincter of Lütkens, 2 of which were associated with a duodenal ulcer. In all these cases a vagotomy was performed and all the results were good.

The opposite condition to a vesicular stasis is a gallbladder which empties too rapidly, vesicular hyperkinesia. In this series there were 6 patients with this condition: in 1 it was associated with a duodenal ulcer and was treated as a duodenal ulcer; 1 patient was treated medically, and 2 had chronic cholecystitis which resulted in an irritable gallbladder, and cholecystectomy was performed. The remaining 2 had marked biliary hypotonia, and right splanchnicectomy was performed. One of the 2 patients who had cholecystectomy was considerably improved and one had a bad result. Of the patients with right splanchnicectomy, one was completely cured and one was considerably improved. The patient with duodenal ulcer was completely cured. The patient on medical treatment was improved but not cured.

The author has abandoned the classical method of cholecystography in favor of the serial method as a means of selection of cases for operation. He concludes that a normal classical cholecystographic report on a patient suffering from symptoms which implicate the biliary tract is incorrect in 95 per cent of cases.

—*Gilbert S. Campbell, M.D.*

Acute Cholecystitis; the Changing Characters of the Disease During the Last 16 Years. OLOF OLSSON and YNGVE EDLUND. *Acta chir. scand.*, 1957, 114: 25.

AN ANALYSIS of 895 cases comprising the total number of patients who were operated upon for acute cholecystitis from 1940 to 1955 shows that the character of the condition has changed in several respects. A high rectal temperature and marked abdominal tenderness were formerly more common and frequently prompted emergency operation. The relative incidence of acute cholecystitis shows a greater increase among men than among women. Acute cholecystitis is now more common among patients under 40 years of age. Cholecystitis is preceded by a greater number of attacks of biliary colic. Stone impacted in the cystic duct with

colorless bile in the gallbladder is now seen more frequently.

The authors suggest that the fact that acute cholecystitis is now less severe may be attributable to the fact that patients are hospitalized more promptly after the onset of the condition. The remaining differences cannot be attributed to selection and the authors state that they are unable to express any opinion as to the cause of these changes.

—*W. Foster Montgomery, M.D.*

Functional Postcholecystectomy Disturbances of the Sphincter of Oddi Due to Division of Autonomous Pericystic Plexus. (Rôle du plexus nerveux péricystique dans la pathogénie des troubles fonctionnels oddiens après cholécystectomie). J. STALPORT, E. NICOLAS, and A. DEMELENNE. *Acta chir. belg.*, 1957, 56: 753.

THE AUTHORS endeavor to find the cause of the well known postcholecystectomy disturbances, especially those in the form of dilatation of the common duct. Various explanations have been presented by various authors: relaxation of the sphincter of Oddi with duodenal reflux, spasm of the sphincter, and primary atony of the common duct.

It is well known that the biliary ducts and the gallbladder possess a reciprocal innervation via the vagus and sympathicus. The excitation of the vagus causes a relaxation of the sphincter and contraction and emptying of the gallbladder. The excitation of the sympathicus has an opposite effect. The whole problem is complicated by the additional hormonal, mechanical, and alimentary effects upon the state of contraction and emptying of the biliary system. Finally, it appears that there is an independent intramural reciprocal innervation of the biliary system independent of the vagus and sympathicus as the contraction of the gallbladder and relaxation of the sphincter of Oddi persist after sectioning of both the vagus and the sympathicus.

The experimental part of the article concerns an attempt to show such independent reciprocal innervation of the biliary system and its influence upon the postcholecystectomy state. The animal experiments were performed on dogs under ether anesthesia. The cystic duct with the accompanying cystic plexus was isolated. A cannula was inserted into the cystic duct to reach to the common duct. A ligature was applied, separating the cystic duct from the gallbladder. The cannula then was connected with a manometer which in turn was attached to a volumeter registering on a Sanborn type of registering device. While the common duct was perfused with physiologic electrolyte solution the following basic tracings were obtained: the normal volumetric tracing showed regular excursions due to (a) respiration, (b) muscular contractions of the common and hepatic ducts, and (c) rhythmical opening and closing of the sphincter of Oddi. Superimposed upon those basic variations were changes caused by the experimental interference.

Electrical irritation of the cystic plexus (cystic nerve) causes immediate dilatation of the sphincter of Oddi and cessation of the rhythmical contractions of the sphincter. If the vagi are sectioned subdiaphragmatically, the same sphincter response to the excitation of the cystic plexus is seen. If the cystic plexus undergoes a prolonged excitation period the rhythmical contraction and dilatation of the sphincter of Oddi return. However, the rhythmical movements are now of a prolonged duration and larger amplitude.

On using higher perfusion pressure it is seen that hypertension of the biliary system does not influence the movements of the sphincter. Last but not least sectioning of the cystic plexus causes a momentary acute dilatation of the sphincter which subsequently goes into a persistent spasm. Rhythmical movements return eventually; however, they are of a much smaller amplitude because of persistent high tonicity of the sphincter.

The authors arranged similar experimental conditions during cholecystectomy procedures in human cases. They sectioned the cystic plexus prior to sectioning of the cystic duct. There was a similar momentary acute dilatation of the sphincter followed by a persistent spasm. In cases in which severe pathologic changes were present in the form of pericholecystitis, this sphincter response was absent, undoubtedly because of change in response due to distorted anatomy and physiology. Thus, an intimate nerve correlation is shown between the gallbladder and the sphincter of Oddi. Irritation of the cystic plexus causes a dilatation of the sphincter, and sectioning of the plexus causes a spasm of the sphincter. This response is independent of the vagus. A center of rhythmical autonomous movements is postulated, which conceivably is influenced by the sympathicus and parasympathicus; however it retains its autonomous action after division of these nerves. Passage of the food into the duodenum causes dilatation of the sphincter and contraction of the gallbladder. It is probably mediated by acting upon this local autonomous center via the hormonal or nervous pathways. The persistent spasticity of the sphincter, seen experimentally after sectioning of the cystic plexus, explains at least partially the so-called postcholecystectomy syndrome.

Obviously, an "incidental" cholecystectomy, practiced by some surgeons, is by no means an innocuous procedure and disturbs the very fine nervous regulatory mechanisms by sectioning the cystic plexus and causing a spastic state of the sphincter of Oddi.

—*Gunars Medins, M.D.*

A Rare Case of Traumatic Hemobilia (Text in Greek). A. MANOS. *Acta chir. hellén.*, 1958, 5: 61.

THE AUTHOR reports the case of a 25 year old soldier who, following an automobile accident producing contusion of his abdominal area, developed abdominal pains, cold sweats, and dizziness. In a few days, he recovered completely only to develop an obstructive type of jaundice 15 days following the accident and lasting 16 days.

Two months after the accident, and for 5 months thereafter, the patient had four or five episodes of hematemesis and melena. He was diagnosed, during that time, as having a duodenal ulcer and was treated conservatively. However, repeated upper gastrointestinal series were negative for ulcer. Subsequently,

because of the continued episodes of hematemesis, melena, and a low red blood count, he underwent two exploratory laparotomies 8 and 10 months respectively, after the accident. He was subjected to choledochostomy and gastroduodenotomy twice, and splenectomy. Postoperatively, the patient bled again through his gastrointestinal tract and through the T-tube and was treated for shock with blood transfusions. Between the two operations, he had drainage of a right subphrenic abscess.

Finally, the author, having been informed of Sparkman's article in the December, 1953 issue of the *Annals of Surgery* concerning the cases of traumatic hemobilia, operated on his patient and ligated the offending vessels in a hemorrhagic cavity inside the substance of the right lobe of the liver. He was guided to the proper area of the liver by a longitudinal scar on the anterosuperior surface of the involved lobe. He drained the intrahepatic cavity. The patient has remained well 4 years after his last operation.

The author, stressing the importance which the correct diagnosis bears on this condition, quotes Spector's article in the *Annals of Surgery* of February, 1957, in that 22 operations were performed in 9 reported cases of traumatic hemobilia. From his study of the reported cases the author thinks that all cases of trauma to the liver should be operated upon, and that a drain should be placed around the affected area of the organ as well as inside any existing hemorrhagic cavity in the liver parenchyma.

He also reminds us that trauma, colic, hematemesis, and/or melena should always make one suspicious of traumatic hemobilia.

—*Nicholas J. Demos, M.D.*

MISCELLANEOUS

Immediate and Remote Results of Surgery of Rectal Cancer (Résultats immédiats et éloignés dans la chirurgie du cancer rectal). J. Coffé and M. Vigoni. *Acta gastroenter. belg.*, 1957, 20: 847.

The authors furnish statistical data concerning 168 cases of cancer of the rectum in which operation was done concurrently by two teams.

With the exception of 7, all of the tumors were adenocarcinomas.

Of 168 interventions, 134 were radical procedures, namely, 28 anterior resections, 28 Babcock's pull-through operations, and 78 abdominoperineal resections with a postoperative mortality of 6 per cent.

Anterior resection is performed when the tumor is located either at the level of the peritoneal reflection or above it. This operation may also be employed as a palliative measure in the presence of metastases. The authors routinely perform a one stage operation, supplementing the resection with cecostomy, and insert a Penrose drain only if the suture line is subperitoneal. The mortality after 28 anterior resections was 7.1 per cent.

Five fatalities occurred in a series of 28 pull-through operations. A two-team procedure greatly reduces the technical difficulties because the risk of necrosis, attributable to poor vascularization of the intestinal segment to be lowered, can be eliminated either by colostomy or by mobilization of the splenic flexure.

The authors employ Babcock's method if the tumor is small and located not lower than 7 cm. above the anal margin. Five year cures after this operation were slightly more numerous than after anterior resection.

In regard to facility of the technique and the immediate as well as the remote results, abdominoperineal resection retains its first place among the various operative procedures. Of 78 patients only one succumbed to this operation, although in 20 cases additional procedures, such as partial cystectomy, reimplantation of the ureters, hysterectomy, or partial prostatectomy, were employed. In all instances two surgical teams worked concurrently.

The authors ligate the inferior mesenteric artery below the left colic artery whenever an extensive resection is required, and pay great attention to peritonealization and obliteration of the left colonic gutter. The colostomy is trimmed and mucocutaneous suturing performed 12 days after the operation. Colostomy is performed at the "left McBurney's" point. Steel wire is used for closure of the perineal as well as the abdominal wound. Oxycellulose is placed in the hollow of the sacrum.

Five year cures were recorded in 45.8 per cent of the patients after abdominoperineal resections and in 34 per cent after anterior resections or pull-through operations. Whereas no postoperative fatalities occurred after abdominoperineal resections, 5 patients succumbed to the other types of operations. If this fact is taken into consideration, the conclusion is allowed that the five year survival rate was equal in both groups.

An increase in the percentage of cures can be expected only from an earlier diagnosis. The authors are convinced that in a large percentage of cases cancer of the rectum originates in a polyp.

—*Joseph K. Narat, M.D.*

Extrarectal Metastases from Malignant Disease of the Mammary Area and Part of the Abdomen, Simulating Primary Rectal Carcinoma. Harry E. Bacon, G. Villalba Lopez, and T. B. Myers. *J. Internat. Coll. Surgeons*, 1958, 29: 232.

Metastatic growths from distant sites may encroach upon and even surround the rectum, causing symptoms referable to the lower part of the bowel and signs misinterpreted as those of primary rectal malignant tumor. A thorough understanding of the condition in its various phases is advised by the authors, in order to avoid radical extirpation in such a case.

Metastatic deposits in the cul-de-sac of Douglas (rectouterine pouch) in ordinary circumstances can be palpated through the anterior or the anterolateral wall of the rectum, according to their anatomic distribution. Growths the size of a pea may be felt occasionally, although it has been the authors' experience that the size estimated by digital examination of the rectum is not always verified by operation or autopsy. Coalescence of these deposits, which vary in size, shape, and number, produces a ledge spoken of as the "rectal shelf." In such a case, digital examination of the rectum elicits a nodular growth anterior or anterolateral to the rectal wall and approximately

TABLE I.—AUTHORS' SERIES OF CASES TO 1957

Primary Site of Cancer	*No. of cases*
Stomach	32
Pancreas	6
Ascending colon	4
Breast	2
Common bile duct	1
Esophagus	1
Kidney	1
Retroperitoneal area (sarcoma)	1
Duodenum	1
Total	49

5 to 10 cm. above the anal margin in the female and 1.5 cm. above the prostate in the male. As would be expected, it is hard, not usually tender. Ordinarily a sulcus can be felt between the mass and the upper rounded border of the prostate. The mucosa of the rectum, being uninvolved, is freely movable over the growth; this is the main feature in distinguishing it from primary carcinoma of the rectum. Increase in size and extent may readily cause impingement on the anterior wall, in which case the examining finger encounters backward displacement of the rectum by a mass anterior to and outside its wall. Occasionally the metastatic process encircles the rectum so as to cause occlusion, either partial or complete. Although it is quite possible for the process to infiltrate the rectal wall proper and cause fixation of the mucous membrane, it has been the authors' experience, even in those cases presenting almost complete obstruction, that the mucosa was movable and free of ulceration.

Over a period of 24 years, 49 patients with metastatic deposits in the rectal shelf from upper abdominal and mammary malignant disease have come under the authors' observation. The primary sites of tumor are shown in Table I. The stomach is by far the most common primary site. In the majority of instances, symptoms referable to the lower part of the bowel were cited by the patient, although these were not symptoms frequently described as suggestive of primary carcinoma of the rectum, such as change in bowel habit, early morning diarrhea, frequency, and urgent desire for and incompleteness of stool, and bleeding. In all, digital examination of the rectum elicited one or more hard masses of varying size anterior to, rather than in, its wall. In no instance was the rectal wall ulcerated. The prognosis in such cases is poor, as a far advanced malignant growth is indicated. Surgical intervention, except as a palliative procedure, is contraindicated.

Thirty of the tumors occurred in males and 19 in females; the youngest patient was 37 and the oldest 70, the average age being 54.5 years. Although in all cases in this series the tumors were advanced, it must be realized that the metastasis may occur early and be the only site of invasion. The condition is important in that it is not rare and the symptoms may not direct attention to the primary site, because the extrarectal process may be incorrectly diagnosed and surgical extirpation performed. The primary growths occurred most frequently in the stomach. As to the type of tumor, 21 tumors were adenocarcinomas and one tumor was a sarcoma. Although misinterpreted in many instances, the growths were palpated by rectum. This points up the extremely important fact that no physical examination is ever complete without a thorough digital and proctosigmoidoscopic examination. —*Earl W. Cauldwell, M.D.*

GYNECOLOGY

UTERUS

Clinical and Therapeutic Study of Tuberculosis of the Uterine Cervix; Work Based upon the Study of 102 Cases (Etude clinique et thérapeutique de la tuberculose du col utérin; travail basé sur l'étude de 102 cas). F. NOGALÈS and E. VILAR. *Rev. fr. gyn. obst.*, 1957, 52: 275.

THE CLINICAL ASPECTS of, and mode of therapy for, 102 cases of cervical tuberculosis are described. In the Madrid Gynecologic Clinic during the time of this study (11 years) 410 cases of endometrial tuberculosis were diagnosed. The total number of histologic examinations in this clinic during the period was 9,800. Fifty-five per cent of the patients with cervical tuberculosis had endocervical lesions. The remainder had tuberculosis of the pars vaginalis. Eighty-two per cent of the patients were between the ages of 20 and 35 years. Previous tuberculosis in other sites was noted in 30 per cent of the patients. Late puberty, uterine hypoplasia, and sterility were prominent clinical factors. Posttrauma metrorrhagia occurred in 38 per cent of the cases. Amenorrhea from a few months to several years was recorded in 35 per cent of the patients. Leucorrhea, usually a thick, adherent mucus, was present in 90 per cent of the cases.

While primary sterility occurred in 80 per cent of the patients, secondary sterility was a prominent feature in the individuals who had delivered an infant. The secondary sterility was seen for a minimum period of 2 years. Most of the patients had experienced 6 to 10 years of involuntary sterility.

The diagnosis was established in all cases upon a histologic basis. The authors were skeptical as to the value of roentgenographic or bacterial studies. Grossly, there were three types of lesions: (1) pseudopapillary, (2) ulcerative, and (3) hyperplastic. The last two clinical pictures grossly resembled carcinoma. Two patients had both carcinoma and tuberculosis.

In 76 cases an antibiotic (streptomycin) and chemotherapy (isoniazide acid hydrazine and para-aminosalicylic acid) were utilized as the only means of therapy. Streptomycin was given both parenterally and locally by means of a tampon containing 1 gram of the antibiotic.

Surgery was utilized for the patients who had purulent salpingitis due to nontuberculous bacteria and gross hydrosalpinx. Surgery was utilized only after 3 months of antibiotic and drug therapy.

The results of treatment are not given.

—*George C. Lewis, Jr., M.D.*

The Use of Newer Progestins in the Treatment of Endometriosis. ROBERT W. KISTNER. *Am. J. Obst.*, 1958, 75: 264.

ENDOMETRIOSIS is a crippling disease of the female reproductive system for which treatment is often unsatisfactory or extreme. Hormonal therapy, either with estrogens or androgens, is uncertain, temporary, and often associated with undesirable side effects, while a conservative surgical approach is not always successful in relieving the symptoms or restoring fertility. Definitive surgery leaves the patient castrated and vulnerable to subsequent neuroses and occasional psychoses.

Since it is the impression of many observers that pregnancy may alleviate, or possibly even prevent, endometriosis, a new approach to therapy is suggested. Given an unmarried or infertile patient, it is now practical to induce a state of simulated pregnancy or "pseudopregnancy" for a significant period of time by the combination of estrogenic substances and the newer progestins. Postulating that the improvement noted in pregnancy is due to a decidual reaction followed by decidual necrosis and absorption in the areas of endometriosis, it seems likely that exogenous hormones will produce a similar reaction. Thus, it may be hoped that the patient will benefit, not only from an anovulatory state during the period of treatment, but also from permanent improvement of the condition brought on by decidual necrosis of the endometrial lesions.

With this in mind, the author has produced "pseudopregnancy" in a series of 12 patients for periods ranging up to 7 months. Sufficient therapy was given to induce amenorrhea, weight gain, breast swelling, secondary pigmentation, and a softening and enlargement of the uterus.

In order to avoid a mistaken clinical diagnosis of endometriosis, the patients were selected and observed by one physician. The criteria for diagnosis included not only subjective symptoms but also objective findings. In all of the patients there was definite involvement of the posterior cul-de-sac and/or uterosacral ligaments with fixation of the uterus. Adnexal masses were present in some but not all of the cases. All patients had previously been treated with analgesic drugs. Six had received estrogens and 2, androgens, for the purpose of depressing ovulation.

Four varying treatment schedules were devised, three combining estrogen and progesterone, and the fourth utilizing progesterone alone. The estrogens employed include diethylstilbesterol (an initial dose of 5.0 mgm. per day orally increased by weekly increments to a maximum of 60 mgm.), estinyl (0.05 mgm. per day orally similarly increased to a maximum of 0.60 mgm.), delestrogen (10 mgm. intramuscularly per week increased every 2 weeks to a maximum of 35 mgm.). Progestins included delalutin (an initial dose of 62.5 mgm. intramuscularly per week increased every 2 weeks as follows: 125 mgm., 187.5 mgm., 250 mgm., 375 mgm., and 500 mgm.) and enovid (10 mgm. orally per day increased every 2 weeks to a maximum of 40 mgm.).

The results of treatment were as follows: 9 patients were subjectively and objectively much improved during the period of "pseudopregnancy." Endometrial biopsies demonstrated decidual change and decidual necrosis. The tenth patient (diethylstilbestrol and delalutin) complained of cramping abdominal

pain after 2.5 months of treatment. Medication was discontinued and she subsequently aborted a large decidual cast. The eleventh patient (diethylstilbestrol and delalutin) was subjectively improved, but uterine hemorrhage at 15 weeks necessitated a curettage with removal of large amounts of decidua. The twelfth patient (diethylstilbestrol and delalutin) bled at 10 weeks. Surgery was elected at her request. While waiting for surgery, she was treated with enovid for a period of 6 weeks. Resected endometriosis demonstrated extensive areas of decidual transformation with areas of focal necrosis.

It may be possible to eliminate undesirable uterine hemorrhage during treatment by omitting exogenous estrogens, which stimulate excessive growth of the endometrial vasculature. With normal endogenous estrogens plus exogenous progestin, good decidual transformations have been observed. Two patients are currently being treated by enovid alone.

Whether the improvement noted will be semipermanent or permanent awaits further evaluation. At the moment, the following observations can be made: (1) a state of pseudopregnancy is immediately beneficial to the majority of patients with symptomatic endometriosis, (2) evidence suggests that this improvement is at least in part due to a decidual transformation in the lesions of endometriosis followed by decidual necrosis and absorption, and (3) variations in dosage of estrogens and progestins seem to be necessary to produce optimum results.

—Lester T. Hibbard, M.D.

Transformation of Intraepithelial Pavement Epithelioma of the Uterine Cervix into Invasive Epithelioma; Study of 6 Observations (Transformation d'épithélioma pavimenteux intra-épithéliaux du col utérin en épithélioma invasifs; etude de six observations). R. MORICARD and R. CARTIER. *Gyn. obst.*, Par., 1957, 56: 333.

AFTER A DELAY varying from 2 to 6 years, 6 patients were discovered to have invasive carcinoma when an initial study revealed noninvasive cancer of the uterine cervix. An examination of the original pathologic material revealed definite noninvasive carcinoma in three of the specimens. In one case there was some question of borderline changes. Two other cases had such intense inflammatory reaction that the appearance of noninvasive cancer could have been ascribed to an inflammatory response but for the subsequent development of invasive cancer. In all except 2 cases, selected punch biopsies served to establish the original diagnosis. In one case a cervical amputation seemed to include all of the noninvasive cancer and no residual cancer was suspected. In another case, a large segment of the cervix was removed under anesthesia. Original sections showed no cancer. Further sections performed later showed noninvasive carcinoma deeper in the paraffin block. It was concluded that multiple punch biopsies from noniodine staining sites selected under the colposcope gave more accurate results than segments removed from the cervix.

The noninvasive lesions were discovered at the squamocolumnar junction. In contrast, the invasive cancer was usually situated in the endocervical canal.

Unfortunately, all of the patients failed to maintain a consistent follow-up which might have permitted the earlier discovery of a recurrence. Fulguration and cauterization employed in several instances may have served to conceal the evidence of persistent cancer.

—George C. Lewis, Jr., M.D.

Critical Observations in the Early Diagnosis of Cancer (Kritische Betrachtungen zur Karzinomfruehdiagnostik). H. K. ZINSER and G. KERN. *Geburtsh. & Frauenh.*, 1958, 18: 105.

IN A SERIES of 137 histologically confirmed surface or early invasive cancers of the cervix, a positive colposcopic diagnosis was made in 16.1 per cent (with adaptive vessel hypertrophy), and a diagnosis of suspicious findings (changes in the matrix and transformation zones) in an additional 51.1 per cent. Since the remaining 32.8 per cent of cancers were missed by colposcopy this method cannot be relied upon to screen out all normal cervices. Such normalcy can be claimed only when the squamocolumnar junction of the cervix is visualized in its entirety and no squamous epithelium is found outside of the field of vision.

With advancing age the predilective site for atypical epithelium will be displaced intracervically as shown by Hamperl *et al.* (*Arch. Gynaek.*, 1958, 190: H.4), and will thus be removed from direct view but still be accessible to cytologic investigation. This picture of transformation zones occurs in 60 per cent of the women in the fifth decade of life. After that the original epithelial covering will be predominant, while ectopic columnar epithelium at the portio is found in 70 per cent of young adults, but only in 10 per cent of patients beyond the age of 65.

In 6 to 8 per cent of the cases, however, colposcopy is more reliable than smear technique. In a collected series of 1,258 surface cancers, cytology led to the diagnosis in 1,027 cases; in other words, a negative smear excludes cancer with an 80 per cent certainty. In the other cases, desquamation of malignant cells is presumably atypical or absent, and the limit of cytological interpretation of a positive smear is dyskaryosis of the superficial cells.

Since cervical biopsy may miss the area of malignant change or invasion, a smear should not be called "false positive" until conization of the cervix has been done, and further study has ruled out the uterus, tubes, and ovaries as sites of a primary cancer.

When these limitations of different approaches are kept in mind it appears that colposcopy has still definite value for screening and decreasing the workload of the cytological laboratory if mass examinations are done. The combination of both methods should improve the success rate in early cancer detection.

—W. D. Bergman, M.D.

Anatomopathologic Classification of Carcinoma of the Uterine Cervix, with Particular Regard to Some Associated Histopathologic Findings (Classificazione anatomo-clinica del carcinoma del collo dell'utero con particolare riguardo ad alcuni reperti isto-patologici associati.) ALBERTO CENTARO and PAOLO MANGIONE. *Riv. ostet. gin., Firenze*, 1957, 12: 403.

THE 150 CASES of carcinoma of the portio reported by the authors were operated upon by the method of

Schauta-Amreich. The tissues for histologic examination taken from the removed uteri were obtained from the middle third of the uterine cervix, from the isthmus, from the bilateral paracervical and paravaginal areas, respectively, and from the vagina about 3 cm. from the respective fornici. The patients were operated upon at the authors' service at the University of Modena, Italy, in the period from October 1, 1950 to February 20, 1956.

From the anatomoclinical findings in general the patients were classified (see J. V. Meigs and A. Brunschwig. *Am. J. Obst.*, 1952, 64: 413; F. V. Meigs. *Surg. Gyn. Obst.*, 1955, 100: 555) as AO (1 case), A (30 cases), B (37 cases), C (67 cases), D (9 cases), and E (6 cases). Survivals under this classification were respectively 1, 25, 25, 37, and 2; there were no survivals for group E.

Certain aspects of the histological findings seemed worthy of discussion. There was a more favorable prognosis for the cases in which the neoplastic process tended to infiltrate upward into the uterine isthmus than for those in which the infiltrative process had spread laterally into the paracervical and paravaginal tissues.

The infiltration of the tissues invaded was in the form of granulation tissue with a predominance of histoid cells, never infiltration of leucocytic and plasmocellular tissue with typical edema of a phlogistic type. The response of the more superficial tissues was of the benign epidermal type described by R. Meyer, a response which is perhaps primarily of a defensive character, but showing, at times, a grade of anaplasia which seemed to support the thesis of the plurocentric type of tumor pathogenesis. These changes are most clearly seen in the upper portions of the vaginal canal and indicate the necessity of excising the uterus itself and the upper two-thirds of the vagina. The degree of cancer cell infiltration of the paracervical and paravaginal connective tissues outside of the lymph nodes of this region suggests that much more attention should be given to the supporting fascial and connective tissue structures of this region than has previously been allotted to them. In 2 instances in which endometrial cell collections were encountered in the paracervical and paravaginal tissues a lymphatic form of dissemination of these cells was suggested.

On the whole, the frequent observation of the lack of correspondence between the clinical findings and the stage of histopathologic spread of the neoplastic process suggests that systematic histologic control of the operative specimens is indispensable in order to furnish data of a more objective character for evaluating the statistical surgical studies.

—John W. Brennan, M.D.

Clinical Significance of Rectal and Bladder Dose Measurements in Radium Therapy of Cancer of the Uterine Cervix. GILBERT H. FLETCHER, THOMAS C. BROWN, and FELIX N. RUTLEDGE. *Am. J. Roentg.*, 1958, 79: 421.

FOR THE PAST 5 YEARS, at the University of Texas M. D. Anderson Hospital and Tumor Institute, direct measurements have been undertaken during intracavitary radium therapy of uterine cancer. In addition, calculations of the volume distribution in the paracervical and parametrial areas have been done. These routine dosimetric procedures have been found to be useful guides in administering treatment with the radium by the external irradiation technique.

In the material reported, the incidence of complications had diminished.

There is no evidence of absolute levels for the radiation tolerance of the bladder and rectum. One should not set up radium techniques based on these figures.

There is a wide margin of dose levels within which an increase in the incidence of complications will probably occur. These levels are only valid for one radium and external irradiation technique and one method of obtaining the physical data. The incidence of complications should not be taken by itself alone, but should be correlated with the stage of the cancer and the freedom from local residual or recurrent disease. Racial characteristics, associated diseases, and anatomic anomalies must also be considered. If one is dealing with early cases, one should be more strict with the incidence of bladder and rectal complications than if one tries to increase the local freedom of recurrence or residual disease in the late stages.

In the hands of experienced clinicians, complications are rare in the early cases even without the help of dosimetric procedures. It is in the late stages of the disease that one must deviate from standard procedures in order to increase the cure rates. Dosimetric procedures are then helpful. These procedures are not only useful in the detection of abnormal situations but also aid in obtaining a better clinical estimation of the effectiveness of the radium insertion in relation to the shape and extent of the disease. They form an incentive for the careful evaluation and individualization of the case, similar to the use of the Meredith-Stevenson system for radium implants which not only determines accurate tumor doses but helps give a better clinical appraisal of the value of the implant.

—Alan Rubin, M.D.

Five-Year Cure Rates of Clinically Occult and Suspected Uterine Carcinomas; a Community Cancer Detection Program. EDWARD L. BURNS and T. W. GORSKI. *J. Am. M. Ass.*, 1958, 166: 568.

THE EXPERIENCE in the first 9 years of a community cancer detection program is reported. In this time, 29,687 women received 62,382 cytological examinations; 1,951 biopsies were made and 292 cases of carcinoma confirmed—an incidence of 0.98 per cent. These data are analyzed to determine if the program was justified in terms of earlier detection and an improved cure rate.

Among 188 cervical cancers confirmed by biopsy, there were 28 false-negative smears—a detection efficiency of 85 per cent. Among 104 fundal cancers, there were 53 false-negative smears—a detection efficiency of 49 per cent. Cytologic studies furnished the first indication of the presence of cancer for 42 per cent of the cervical, and 20 per cent of the fundal cancers.

Five year survival studies are available for 75 cervical and 34 fundal cancers. For fundal cancer, there were too few cases for comparison of the survival rates of occult and suspected cases. For cervical cancer, a significant difference could be

demonstrated—38 per cent for suspected cases and 91 per cent for occult cases. This is explained by the preponderance of in situ and early invasive stages in the occult group (82 per cent). There were no deaths associated with in situ carcinoma. Occult lesions were found in a younger age group (by 9.5 years for cervical and 4.5 years for fundal lesions).

These statistics would seem to indicate that repeated routine vaginal cytological studies will detect cancer of the cervix at an earlier stage and in younger women than if the lesion is allowed to progress until clinically suspected. Early detection and treatment may produce 5 year survival rates as high as 90 per cent. —*Lester T. Hibbard, M.D.*

Vaginal and Abdominal Total Hysterectomy; Primary and Late Results. OLE G. BACKER and K. KRISTOFFERSEN. *Acta chir. scand.*, 1957, 114: 67.

RESULTS ARE COMPARED for a concurrent series of 99 vaginal, and 110 total abdominal hysterectomies. In this group the vaginal operation was selected when there was a roomy vagina, a mobile and not too large uterus, no evidence of pelvic infection, no question of pelvic cancer, and no prior pelvic surgery. On the basis of these criteria, 73 per cent of the vaginal, and 5 per cent of the abdominal procedures were done for the indication of prolapse with or without fibromyoma and metrorrhagia. Candidates for the vaginal operation were somewhat older.

The technique for vaginal hysterectomy included fixation of the pedicles to the vaginal vault, closure of the vault in a frontal plane, and posterior colporrhaphy. Anterior colporrhaphy was done only in the presence of a cystocele. No special effort was made to repair the perirectal fascia to the level of the vault. During abdominal hysterectomy, the vault was suspended as high as possible to the uterosacral and round ligaments. Anesthesia and postoperative care were identical for both groups except that an indwelling catheter was left in place for 5 days after vaginal hysterectomy.

The postoperative complications were similar, totaling 9 per cent for the abdominal, and 12 per cent for the vaginal operation. Hyperpyrexia was identical. Two deaths followed abdominal hysterectomy for fundal cancer (pulmonary embolus and pneumonia). In general, postoperative complications of vaginal surgery occurred in a group of 27 patients in whom the operation proved difficult. It was thought that these difficulties arose because the preoperative evaluation of the size and mobility of the uterus had been in error.

Excluding the patients undergoing a radical operation for cancer, 1.5 to 2.5 year follow-up examinations were available for 87 per cent of the patients. Among 90 patients undergoing the vaginal operation, 39 presented vaginal prolapse—which condition was a recurrence in 35 instances and a symptomatic condition in 20 instances. This represents a recurrence rate of 48 per cent (35 of 73 cases). Among the cases in which no prior prolapse had been noted, 15 per cent presented postoperative prolapse (4 of 26 cases). Among the abdominal group, there were 7 cystorectoceles. Three were recurrences, but none were symptomatic.

Since the results after vaginal hysterectomy were so poor, the authors conclude that this operation is probably contraindicated if prolapse is present. When hysterectomy is indicated in the presence of prolapse, it should be done by the abdominal route and preceded by vaginal plastic repair. If hysterectomy is not indicated, anterior and posterior repair, possibly combined with cervical amputation, should be preferred. In other words, there are few indications for vaginal hysterectomy.

—*Lester T. Hibbard, M.D.*

ADNEXAL AND PERIUTERINE CONDITIONS

Ovarian Goiters (Bócios ováricos). JOÃO GIL DA COSTA. *Acta gyn. obst. hisp. lus.*, 1957, 6: 293.

AMONG 654 OVARIAN TUMORS studied in the Department of Pathology, University of Porto, Portugal, there were 5 ovarian strumas. Three of the latter were components of cystic teratomas and 2 were true ovarian goiters. The latter were so designated because they were formed exclusively of thyroid tissue.

The thyroid tissue in these tumors was morphologically and histochemically identical to the tissue of the cervical thyroid, and the pathologic changes found in the ovarian thyroid and the staining properties of its colloid substance were similar to those of the cervical goiter.

These observations corroborate the thesis that the ovarian struma is (as is the lateral thyroid) an authentic aberrant thyroid. —*Mansur Taufic, M.D.*

Contribution to the Study of Feminizing Tumors of the Ovary (Contributo allo studio dei tumori femminilizzanti dell'ovaio). PAOLO MANGIONE. *Riv. ostet. gin.*, Firenze, 1957, 12: 303.

FOUR TUMORS OF THE OVARY are reported and analyzed clinically and pathohistologically to ascertain whether any feminizing function displayed by these neoplasms results from an estrogenopoiesis on the part of the granulosa or of the thecoma interna component of the ovarian tissue.

The first two tumors were diagnosed as granulosa cell tumors of the ovary. The third, a typical granulosa cell tumor, and the fourth, a thecoma of the undifferentiated type, gave no evidence of estrogenic activity.

The first patient was a 56 year old multiparous woman who had been complaining for a year of more or less intense episodes of metrorrhagia. Examination disclosed an orange-sized tumor which had displaced the uterus toward the right side of the pelvis. The mass was removed en bloc by total hysterectomy and bilateral adnexectomy.

Macroscopically the uterus was larger than normal with subserous and intramural myomatous nodules. The tubes were apparently normal. The left ovary was small and sclerotic.

The mass on the right side was encapsulated, of grayish color, mammillated, and oval in form. On the cut surface were irregular cavities with dark-brown viscid content.

Histologically, the tumor tissue was of the granulosa type, the cells agglomerated in isolated masses and characteristically without evidence of a vascular

supply. Here and there were typical Call-Exner bodies. Of the greatest significance was a limited area in which the granulosa agglomerations were surrounded by a thick mantle of polyhedral cells with abundant cytoplasm, with vacuolar cavities and large vesicular nuclei. Here the ample blood supply resembled that of the theca interna. The histologic diagnosis was granulosa cell tumor with a highly differentiated thecal component.

The second patient was a 56 year old secundipara who had entered the menopause in her forty-seventh year and who, during the past 6 months, had been suffering from irregular attacks of bleeding from the vagina.

The curetted endometrial mucosa was hyperplastic. A tumor mass was present in the region of the right ovary. It was removed together with both adnexa and the uterus.

Macroscopically the right ovary was transformed into a tumor the size of a lemon. A portion of the ovary remained as a nodular protrusion on the tumor's surface. In the area of transition between the ovarian remnant and the tumor mass were some bluish-colored cystic formations. On the cut surface of the neoplastic mass were cavities of varying size, containing a brownish liquid.

Histologically, the parenchyma showed the typical picture of a granulosa tumor with absence of a vascular component. The cystic formations presented a different picture. The cavities were lined by an epithelioid type of cell surrounded by a fine basal membrane. Its appearance suggested the so-called membrane of Slavjaschy. Outside this membrane was a dense stratum of epithelioid cells with vacuolated cytoplasm and large, rounded, nucleolated nuclei. There was a fine argentophilic reticulum and a rich vascular supply.

The author believes that granulosa cells do not produce estrogen and that their lack of blood vessels supports his belief. In the instances in which it has been thought the granulosa cell tumor exerts an estrogenic hormone function the thecalike component of the granulosa cell tumor may have been overlooked. He recommends that a more comprehensive histologic study be made of these tumors.

—John W. Brennan, M.D.

Brenner Tumors. Histo-Pathogenetic and Endocrinologic Considerations (I tumori di Brenner; Rilievi istopatogenetici ed endocrinologici). MASSIMO MACCIOTTA. *Riv. ital. gin.*, 1957, 40: 335.

TWO INSTANCES of Brenner tumor are reported. The report is accompanied by comprehensive photographic and histopathologic reproductions.

The first patient was a 70 year old unmarried woman who, when 42 years of age, underwent roentgen castration for intractable metrorrhagia. For the past 5 years she had suffered attacks of genital bleeding which developed every 6 or 7 months and lasted 3 to 4 days. Recently the bleeding had been continuous, although of varying intensity.

Examination disclosed a blood pressure of 240/125. The uterus was of normal consistency, smaller than normal, and pushed to the left by an orange-sized, firm, nodular tumor of the right ovary. Vaginal cytology indicated the presence of a normal postovular menstrual phase with marked acidophilia (32 per cent) and a high index of pycnosis (97 per cent). The tumor was removed en bloc by subtotal hysterectomy and bilateral adnexectomy.

The histological examination showed that the right ovary had been replaced by typical Brenner tumor tissue. The left ovary was merely a small mass of homogeneous sclerotic tissue with two superficially placed tiny nodules of Brenner cells, similar to those in the other ovary.

The second patient was a 52 year old married woman with 2 children who had reached the menopause 3 years before. Recently she had noted the loss of small amounts of blood from the genital tract. The colpocytologic picture was not as frankly estrogenic as in the first patient, but a moderate amount of estrogenic activity was present. Acidophilia was 16 per cent and the pycnotic index 98 per cent.

Celiotomy disclosed a normal-sized, retroverted uterus and replacement of the left ovary by a firm and nodular tumor the size of a fetal head. The tumor was removed en bloc by subtotal hysterectomy and bilateral adnexectomy.

The histologic findings were typical of a Brenner tumor.

The author believes that these are the first cases of Brenner tumor in which the condition was controlled for any considerable period of time (18 months) following removal of the new growth. In these 2 patients there was a noticeable regression of the symptoms after 18 months which could be ascribed to a state of estrogenism, and he therefore believes that a Brenner tumor can produce hormonal activity of a mixed type. *—John W. Brennan, M.D.*

Congenital Anomalies of the Tube; Diverticuloses of the Tube (Sur les anomalies congénitales de la trompe; la diverticulose tubaire). J. BRET, J. BARRIER, and B. DUPERRAT. *Rev. fr. gyn. obst.*, 1957, 52: 345.

THE TERMINOLOGY AND PATHOGENESIS of tubal abnormalities have, at times, been confusing because of failure of many authors to follow standard definitions of various pathologic entities involving the uterine tubes. Diverticula of the tube must be differentiated from inflammatory lesions and endometriosis. A diverticulum of the tube is defined, specifically, as a herniation of the tubal mucosa into or through the tubal musculature as far as the serosa. The diagnosis should be established on histologic findings, although salpingography may be useful in revealing suspected anomalies to the clinician. Seventeen cases are reported by the authors. All gave evidence of one or more diverticula on hysterosalpingography. In 8 cases the lesions were unilateral and in 7 bilateral; in 2 cases lesions were undetermined. The majority of the diverticula were located at or near the ampulla.

The microscopic examination revealed well preserved tubal mucosa in spaces varying from small pouchlike areas to large irregular areas having the appearance of a bifid tube. Associated lesions consisted of adenomyosis (5 cases), leiomyoma (2 cases), and adjacent cysts (4 cases). In 2 cases an associated tubal inflammatory disease (one tuberculous) was noted. Three patients had had an ectopic pregnancy.

Clinically, it was noted that the average age of the patients was 34 years and that sterility or relative infertility was frequently associated with the anomalies. Tubal obstruction was not found to be the cause of the sterility. Pelvic pain and menometrorrhagia were the most frequent complications.

Roentgenographic studies demonstrated marked variation in appearance from single small projections beyond the tubal image to complex arborizations of irregular images adjacent to the tubal lumen. Oil base media were preferred since they produced more precise images. —*George C. Lewis, Jr., M.D.*

Experimental Substitution of an Isolated Segment of Ileum for the Uterine Tube; a Preliminary Report. MERVYN LEE CAREY, LOUIS C. CIAN, HUGH J. DAVIS, BENT BÖVING, and HOWARD W. JONES, JR. *Obst. Gyn.*, 1958, 11: 156.

THE OPERATIVE TREATMENT of sterility associated with known tubal dysfunction is at best discouraging. One possible solution to this threefold problem is to substitute or construct an organ to replace the diseased tube completely and carry out the three essential functions: (1) entrapment of the ovum, (2) provision of a patent lumen to the endometrial cavity, and (3) provision of motive force to transport the ovum to this site.

The use of inert materials seems impractical because of the mechanical difficulties and lack of motile force. The only expendable organ meeting the requirements and which is available in the proximity of the uterine tube is an isolated segment of terminal ileum, with its own pedicle and blood supply.

The animal selected for the experiments was one with an international reputation for fertility, the rabbit. Fifteen mature New Zealand giant white does of proved fertility were used in the experiments. A 4 to 5 cm. intestinal segment was isolated from the terminal ileum about 10 cm. from the sacculus rotundus. A salpingo-oophorectomy was done on the right side, and a salpingectomy on the left. The left ovary was secured by a traction suture through the antimesenteric side of the segment at the proximal end. The ovary was then pulled up into the ileal lumen, and the ileum was tacked around the ovarian pedicle by 5 or 6 interrupted fine black silk sutures into the periovarian fat. The other end of the segment was sutured, end-to-end and mucosa-to-mucosa, to the uterus in two layers.

Five animals were sacrificed from 8 to 10 months postoperatively at 10 to 20 hours postcoitum. Each animal showed a clean pelvis without adhesions or scarring; the ileouterine anastomoses were patent; the segment was of normal preoperative size. Active peristalsis was present in the segment; the ovary with ruptured follicles was present in the lumen of the segment in all but one animal, in which no ovarian tissue could be found; active, motile spermatozoa were found in the ileal segment at periods up to 20 hours postcoitum.

A method of substituting an isolated ileal segment for uterine tubes is described, with reports of the postoperative problems and subsequent investigation, including necropsy and histologic examination. Further investigation is surely justified.

—*John R. Wolff, M.D.*

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Adrenocortical Function in Normal Pregnancy (La funzione cortico-surrenalica nella gravidanza normale). F. CASSANO and C. TARANTINO. *Riv. ostet. gin.*, Firenze, 1957, 12: 471.

IN THIS STUDY, conducted on women during normal pregnancy, the estimation of the urinary corticosteroids was accomplished by the method of Porter and Silber (*J. Biol. Chem.*, 1950, 185: 201); the evaluation of the glycometabolic activity of the urinary extract was carried out by the method of Venning (*Endocrinology*, 1946, 39: 203); the activity of the sodium-retaining principle was determined by the method of Luetscher and Johnson (*J. Clin. Invest.*, 1954, 33: 2); titre of the 17-ketosteroids was done by the method of Pincus (*J. Clin. Endocr.*, 1945, 5: 291); the determination of the corticosteroids which are conjugated with glycuronic acid, was done by the method of Glenn and Nelson (*J. Clin. Endocr. Metab.*, 1953, 13: 911); the evaluation of the 11-oxycorticoids, was done by the method of Wallace *et al.* (*J. Clin. Endocr. Metab.*, 1955, 15: 1073); the test of Thorn *et al.* was made (*J. Am. M. Ass.*, 1948, 137: 1005); and, finally, the test for ACTH in the blood was done according to Parrott (*J. Endocrinol.*, 1955, 12: 120).

From the results of these studies the authors do not think that heightened adrenocortical functioning has any direct relationship to the common conception of stress (Selye), that is, the exaggerated and transitory response of the organism to an aggression. The adrenocortical hypertrophy and hyperactivity is clearly distinguishable from the hypercorticalism following an aggression, a response to stress which is intended to protect the organism producing the hypercorticalism and which manifests itself by the prevalent participation of the glycometabolic hormonal sector, whereas the hypercorticalism here considered manifests itself in a more global and harmonic response of all the sectors of the adrenal cortex. In the hypercorticalism of pregnancy the 17-hydroxycorticoids show values which are inferior to those of the normal, nongravid woman; from the fourth month of pregnancy on these values become rapidly augmented. These values are paralleled by the glycoactive and the sodium-retaining fractions.

The 17-ketosteroids, on the other hand, show moderately augmented readings during the first 3 months of pregnancy, and then return to within the limits of the normal nongravid condition. The reserve potential of the adrenocortex remains efficient during the entire time of the normal course of pregnancy. The normal gravid state is characterized during its entire course by an increase in the blood content of ACTH.

The authors think that this increased activity and the metabolic changes which this activity induces may be explained on the basis of the needs of the developing fetus. The retention of the water and electrolytes and the catabolic orientation of the protein and lipidic metabolism of the mother is in response to the developmental needs of the products of conception; it is to be assumed that the fetus is as yet unable to provide for its own hormonal needs and for this reason the mother's organism enters into an especially intimate form of symbiosis with that of the child, thus helping in supplying its hormonal and tissue-building necessities.

—*John W. Brennan, M.D.*

Report on the Surgical Treatment of 26 Uterine Ruptures in the Period from 1953 to 1956 (Bericht ueber 26 in den Jahren 1953 bis 1956 operativ behandelte Uterusrupturen). ALEX FRITZ. *Geburtsh. & Frauenh.*, 1958, 18: 172.

IT HAS BEEN OBSERVED in the past that obstetrics in Java, Indonesia was remarkable because of the rare occurrence of narrow pelvis, infections, and thrombosis. In one statistical review there were only 2 cesarean sections for narrow pelvis and no uterine ruptures among 4,100 deliveries. In North Sumatra, where the author is practicing, the average birth weights are higher, complications much more frequent, and the average conjugata vera is shorter. In a group of 3,743 hospital deliveries during 4 years the author has seen 174 cesarean sections, 4 maternal deaths due to placenta previa and premature separation of the placenta, and 47 operative perforations of dead infants. There have also been 26 ruptures of the uterus with 6 deaths, all of them in multiparas, many of whom had 4 or more children. The author believes that structural weakening of the uterine muscle due to multiparity was an important factor, and it was noted that in 21 cases, in which previous cesarean section, malpresentation, and malformation of the uterus were not the cause of rupture, the tear was found in the lower segment of the uterus and frequently in the cervix and vagina. The explanation for this fact is lay obstetrics that encourages hard bearing down from the onset of labor with resultant premature retraction of the cervix and extreme tension on the vagina before the presenting part has passed the pelvic midplane. Pressure necrosis of the vagina and bladder, with late fistula formation, and fetal death occur frequently at this stage, and a Kristeller maneuver may rupture the uterus at this time. This mechanism was found to be instrumental in 40 cesarean sections before rupture, in which the vagina was frequently entered because it was mistaken for the lower uterine segment.

Only 2 of the patients were operated upon within 2 hours after rupture, while the others had to suffer through 6 or 8 hours of hazardous transportation over forest paths in a state of shock. All patients were considered infected and received massive doses of penicillin and streptomycin (or sulfonamides) immediately on admission while no blood was available. Shock was always treated first with the available means: plasma-expanders, the Trendelenburg position, heat, or camphor or strychnine injections. Local anesthesia with additional ether was used, but vaginal delivery or extraction was rarely done as removal of an infected baby through the abdomen was considered a lesser

risk than delay of laparotomy, further infection from the vagina, removal of a physiologic "packing" of the uterus, and the possibility of bowel prolapse. Once the child was delivered, manual compression of the abdominal aorta clarified the anatomical situation and decreased further blood loss. Total hysterectomy with the adnexa left behind was the treatment of choice. Whenever the patient's condition enforced supravaginal amputation of the uterus, infection of the stump and other complications were troublesome and increased the length of hospitalization. A primary suture of the uterine laceration was successfully done in only one case. The requirements for this procedure are: a delay of not more than 3 hours, a clean wound, absence of gross infection and severe tissue damage, and the possibility of extraperitonealizing the uterine scar completely. Even in very low cervical and vaginal ruptures, with the uterus practically intact, hysterectomy was the better course unless these requirements were met.

The fetal mortality in all complete ruptures was 100 per cent, with a dead fetus on arrival. There were 2 incomplete ruptures, without maternal death. Of 24 mothers with complete rupture of the uterus, 2 died within hours after surgery from shock, 2 died within a few days because of the sepsis, one died after 12 hours from pulmonary edema, and one died on the fifty-fourth postoperative day from ascaris ileus. The diagnosis was simple in all cases, and small bowel distention of unusual degree was a typical finding in most instances. The cases are described in detail and make interesting reading in view of serious mistakes made by lay midwives and witch doctors. It is noteworthy that antibiotics could help the author to achieve such excellent results in the absence of blood replacement and against such overwhelming odds in a backward country. —*W. D. Bergman, M.D.*

PUERPERIUM AND ITS COMPLICATIONS

Postpartum and Postabortion Tuberculous Endometritis (Endométrites tuberculeuses du post-partum et du post-abortum). A.-J. BRET and R. LEGROS. *Presse méd.*, 1957, 65: 2156.

A FEBRILE REACTION or persistent bleeding after a delivery or abortion should be considered possible evidence of tuberculous endometritis, when other bacterial factors or phlebitis have been eliminated.

Two cases are described, one postpartum at 7 and a quarter months and the other postabortal at 3.5 months. The postpartum patient was febrile and had a foul leucorrhea. The diagnosis was suspected after tuberculous cervical adenitis developed in the infant. Endometrial biopsies and guinea pig inoculation substantiated the diagnosis. Chest roentgenograms revealed active pulmonary tuberculosis. After 3 months of therapy with streptomycin, para-aminosalicylic acid, rimifon, and cortisone the chest lesions and endometrial cavity showed evidence of healing. Intrauterine instillations of streptomycin and hydrocortisone were also utilized. After 4 months a hysterogram revealed bilateral tubal occlusion. Therapy was continued through 8 months. At this time a repeat hysterogram revealed patency of the left tube.

Diagnosis of the postabortal case was made by endometrial biopsy and a hysterogram which demonstrated bilateral tubal occlusion. The same program of therapy was instituted. It is believed that in both cases the tuberculous lesions were present during pregnancy and may have been aggravated by the pregnancies. The tuberculous endometritis was considered responsible for the termination of both pregnancies. Systemic and local therapy is indicated and must be continued over a long period of time.

—*George C. Lewis, Jr., M.D.*

NEWBORN

Factors Related to Stillbirths; an Analysis at the Los Angeles County Hospital. JAMES C. CAILLOUETTE and KEITH P. RUSSELL. *Obst. Gyn.*, 1958, 11: 164.

A REVIEW of stillbirth records of infants and mothers has been made at the Los Angeles County Hospital for the fiscal year 1955 to 1956.

Patients with a diagnosis of abruptio placentae and a viable infant must be delivered as soon as possible following admission if a stillbirth is to be avoided.

The diagnosis of amnionitis is an obstetric emergency and must be considered as such if a living infant is to be delivered.

The data presented suggest that early delivery (preterm) of a probable erythroblastotic infant may prevent some stillbirths.

The statistics support the generally accepted principle of delivering patients with diabetes mellitus at 34 to 36 weeks of gestation.

The diagnosis of fetopelvic disproportion should be made as early as possible and cesarean section performed in an effort to prevent prolonged labor, with its concomitant and often unnecessary maternal and fetal stress.

Patients with moderate to severe pre-eclampsia, eclampsia, and a viable fetus should be delivered as soon as feasible, not only for the amelioration of the basic pathologic process, but also to decrease the possibility of a stillborn delivery.

The proper management of shoulder dystocia depends upon sound obstetric principles, judgment, skill, and immediate action.

Prolapse of the umbilical cord with a cephalic presentation is an acute obstetric emergency. Immediate delivery is mandatory to assure a live and uncompromised infant.

The data reviewed do not support the complication of postmaturity as a significant etiologic factor per se in the occurrence of stillbirth.

—*John R. Wolff, M.D.*

The Diagnosis and Treatment of Erythroblastosis Fetalis. MILA PIERCE, EUSTACIA RIGOR, and ABBIE LUKEN. *Am. J. Obst.*, 1958, 75: 357.

INFANTS WHICH WERE BORN with erythroblastosis have been classified into four major groups. The first group consists of those presenting no clinical disease and is not discussed in the present study. The second group includes infants which are mildly affected and characterized by serological signs of isosensitization, hemoglobin of 13 gm. or more, pallor, and splenomegaly, but normoblastosis. During the first 24 hours of life jaundice appears and deepens, as does anemia, but the

clinical condition of the infant remains good. This group includes 50 per cent of the infants affected.

In the moderately severe classification the hemoglobin is less than 13.5 gm. but more than 11 gm. Splenomegaly and hepatomegaly are present as well as excessive numbers of erythroblasts. Jaundice, anemia, purpura, and edema appear early. This group includes 19 per cent of the affected infants.

The fourth group, or seriously affected infants, approximately 30 per cent, is divided into two subgroups based on the severity of the condition. In the first subgroup the hemoglobin is less than 11 gm.; splenomegaly and hepatomegaly is marked. There is pallor and listlessness; marked erythroblastosis and thrombocytopenia are present. Clinically the infants appear to have adequate circulatory and respiratory function to sustain life. In the second subgroup the hemoglobin is less than 9 gm. and in addition to the preceding symptoms there is evidence of circulatory and respiratory failure.

The major causes of death noted in the group of infants studied were hydrops, 32 per cent; extreme erythroblastosis at birth, 12.7 per cent; kernicterus, 29.8 per cent; pulmonary hemorrhage, 8.5 per cent; pulmonary hyaline membrane, 6.3 per cent; purpura and hemorrhage, 8.7 per cent; and cardiac failure, 2.4 per cent.

There were two objectives of therapy. One was the removal of products of blood destruction before damage occurred to the vital tissues, and, the second, correction of anemia.

The authors felt that the most reliable criterion of the progression of the hemolytic process was the bilirubin level. Since it appears from other studies that encephalopathy could be avoided by maintaining the serum bilirubin below 20 mgm. per cent, this appeared to be one of the most important objectives of the exchange transfusion treatment. The hemoglobin level at birth, the serum bilirubin levels during the first 5 days of life, and measurements of other plasma heme pigments in the cord blood were all of important prognostic value. A notable exception to this was the infant who was born with hydrops or with severe disease, in whom the hemoglobin and bilirubin might be misleading.

The results achieved in the group of 217 infants has been well summarized in a number of tables. In comparing the survival rates during the years 1945 to 1951 with those from 1952 to 1956 marked improvement is noted. In the uncorrected group the mortality drops from 29 to 13 per cent. In the corrected mortality rates the drop was from 20 to 5 per cent. The corrected rate was produced by eliminating those infants who were so ill that they failed to survive longer than 90 minutes. Many of these infants had hydrops.

The cases were then reviewed by comparing the type of treatment they received with the severity of the disease according to the classification. In general the tables indicate that exchange transfusion on one or more occasions would yield better results even in the mild and moderate forms of the disease than the older therapy of simple transfusions and no treatment whatsoever.

In reviewing the data of the cases delivered elsewhere and referred to the pediatric section of the hospital, it became obvious that delay in the institution of therapy had an unfavorable effect upon the results. Experience with ABO incompatibilities indicates that this type of erythroblastosis presents some clinical differences from the type associated with the Rh factor in that the clinical appearance of the disease is mild at first. The need for exchange transfusion in these infants did not develop prior to 30 hours. No infants in this group required the second exchange transfusion.

—*James F. Donnelly, M.D.*

MISCELLANEOUS

Induction of Ovulation in the Human Being; Therapeutic and Diagnostic Importance. HERBERT S. KUPPERMAN, JEANNE A. EPSTEIN, MEYER H. G. BLATT, and ABRAHAM STONE. *Am. J. Obst.*, 1958, 75: 301.

ATTEMPTS TO INDUCE OVULATION in the human being by many techniques have usually been associated with failure. The physiology of human ovulation indicates that proper estrogen stimulation may result in successful ovulation in the patient who has no obvious mechanical or endocrine disturbance other than failed ovulation. The follicle-stimulating hormone of the pituitary gland causes the ovarian follicle to mature and, in turn, produce estrogen. This eventually reaches a level at which it inhibits further production of the follicle-stimulating hormone and, in turn, stimulates release of the luteinizing hormone. The luteinizing hormone causes the follicle to rupture with formation of the corpus luteum. The pituitary then releases luteotrophic hormone which maintains the life of the corpus luteum. The corpus luteum secretes progesterone which causes the endometrium to develop a secretory phase. If conception does not occur the corpus luteum dies and the process repeats.

In considering ovulatory failure, patients with other hormone imbalances which might affect the pituitary-ovarian axis secondarily were excluded.

The patients were carefully studied. The studies included the protein-bound iodine, serum cholesterol, 5 hour glucose tolerance, and 24 hour 17-ketosteroid excretion. The patient who appeared to be normal in respect to other hormone functions was then placed on a daily basal body temperature and those women who had prolonged periods of amenorrhea or oligomenorrhea were given 100 mgm. of progesterone in oil. If bleeding occurred within 2 weeks, it was assumed that the patient had a proliferative endometrium. The patient who revealed no other abnormality and who after progesterone exhibited withdrawal bleeding were considered to have some isolated ovulatory defect and were included in the study. The patients were then given 20 mgm. of conjugated estrogens intravenously in a single dose at least 18 days after the last menstrual cycle. Ovulation was considered to have occurred if (1) a significant rise in the basal temperature occurred in one to 3 days after the injection and lasted for at least 12 days, or (2) an increase of the pregnandiol excretion was noted 7 to 10 days after the injection, or (3) secretory endometrium was determined by endometrial biopsy on the first day of the ensuing menstrual period, or (4) conception occurred. An elevation of the body temperature alone was not considered adequate evidence.

Among 40 patients there were 17 who were treated primarily for infertility, of whom 9 subsequently became pregnant. Sixteen patients failed to respond to therapy. Failure was considered due to mechanical inability of the follicle to rupture, probably because of a thickened fibrous tunica. Eight of the patients were subjected to laparotomy with wedge resection and the diagnosis was confirmed. In attempting to induce ovulation in the nonovulatory patient careful selection of the patient for hormone therapy must be made. It was felt that this technique would establish the diagnosis of an extremely early Stein-Leventhal syndrome or polycystic ovary even before it could be detected by pelvic examination. These patients can then be operated upon before loss of ovarian tissue occurs as a consequence of the follicular enlargement.

—*James F. Donnelly, M.D.*

Uterine Irritability; the Concept and Its Clinical Applications, Exemplified by the Oxytocin-Sensitivity Test. C. N. Smyth. *Lancet*, Lond., 1958, 1: 237.

The author reviews the many methods by which the uterus can be stimulated and observes that the magnitude of the stimulus required to elicit a change in myometrial activity and the response of the uterus to a given stimulus are both very variable quantities. He points out that the obstetrician often wishes to know the over-all state of uterine irritability as many clinical questions can be resolved if this information is at hand. Will this patient abort spontaneously? Is labor imminent? Will amniotomy or an oxytocic induce labor?

The author postulates that the patient is a ready-made laboratory and calculating machine which will do the assay and summation and provide the answers directly. He proposes the intravenous administration of minimal doses of oxytocin, 0.01 to 0.1 unit, to produce an increase of uterine activity of observable magnitude. When irritability is considerable, labor is usually imminent; when irritability is less, a longer time will probably elapse before labor begins spontaneously. When delivery is urgent the test enables the obstetrician to decide between oxytocin therapy and amniotomy, or possibly a cesarean section if the uterus is nonirritable.

Data are presented to show that amniotomy is very successful when the oxytocin test has a numerical value of 0.04 unit or less, and is progressively less successful as the sensitivity approaches 0.08 unit. The correlation between the oxytocin sensitivity and the time from amniotomy to the onset of labor is significant at a probability of 200 to 1. After a tocograph has been placed on the abdomen, the mechanics of the test are accomplished by placing oxytocin (0.01 unit per milliliter) in a 10 milliliter syringe and injecting 0.01 unit at minute intervals until a contraction occurs. The total dose which must be given to produce the contraction is called the oxytocin sensitivity.

—*T. W. McElin, M.D.*

Hospital and Hospital Staff Responsibility for Maternal Mortality. D. W. Freeman and Alex Barno. *Minnesota M.*, 1958, 41: 104.

An analysis of the preventable maternal deaths occurring in Minnesota from 1950 to 1954 is presented. During this period 83 maternal deaths occurred in Minnesota which were judged to be preventable by the Maternal Mortality Committee of the Minnesota State Medical Association. Physicians were judged to have been responsible for 66, and hospitals for 5 of these deaths. The three major areas of deficiency as far as the doctors were concerned were: patient work-up, conduct of labor and delivery, and adequate consultation. There has been a 76 per cent drop of maternal mortality rates in Minnesota between 1941 and 1954. This improvement is the result of improved undergraduate training of physicians, increased postgraduate refresher courses in obstetrics, widespread use of chemotherapeutic agents, and early and adequate blood replacement. In addition, public health measures, such as education of the public of the importance of early and adequate prenatal and obstetrical care, as well as maternal mortality surveys for the education of physicians, are factors in the reduction of maternal mortality.

However, in spite of the continuing improvement further strides can be made in reducing maternal mortality by organizing and supervising hospital practice of obstetrics properly.

Formulation of a detailed workable set of recommendations for the organization and regulation of obstetrical departments in all hospitals in the state should be undertaken by the State Health Department in co-operation with representatives of other interested groups. Such groups should include the state and local health departments, state and local medical societies, the state hospital association, and state and local obstetrical societies.

—*Harry Fields, M.D.*

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Adrenalectomy in the Treatment of Advanced Cancer (La surrénalectomie dans le traitement du cancer en phase avancée). M. DARGENT, M. MAYER, and P. BLONDET. *Sem. hôp. Paris*, 1957, 33: 4253.

BILATERAL ADRENALECTOMY in cases of advanced cancer is advocated by the authors, who consider the adrenal glands to be productive of cancerogenic hormones. They believe it is indicated after failure of classical treatment: radiotherapy, castration, or use of sex hormones. Aside from the great operative risk associated with this procedure, the considerable hazard of permanent substitution cortisone therapy is present. Forty-four such cases are reported from the Centre Anticancereux, Lyon. Thirty-one patients were followed up more than 6 months, and 40 more than 2 months.

In 38 cases surgery was performed in two stages, with the right side usually done first since right adrenalectomy is more difficult than left. The lumbar approach was favored under general anesthesia. Curiously, after the first stage, alleviation of pain and euphoria often occurred for 7 or 8 days, without the use of cortisone. This effect was slowly lost.

Subjective effects on pain were more impressive than objective. Results were classified as poor (amelioration less than 3 weeks), good (regression of metastases from 2 to 6 months), and excellent (lesions inactivated more than 6 months). Bone and soft tissue lesions responded particularly well. Spectacular results were achieved in cachectic bedridden patients. The results were poor with metastatic seminomas. Age had no significant influence on the response of the tumor to surgery nor did the menopause.

Castration is considered a good prognostic test for the eventual effects of adrenalectomy and therefore should be done prior to the main surgery. However, it was noted that failure of response to preliminary castration did not indicate that surgery should be avoided. An increase in follicular stimulating hormone following adrenalectomy was claimed to give a favorable prognosis. Three deaths followed the first stage procedure, but no deaths were reported after the second stage. Mortality was usually due to acute adrenal insufficiency or to the consequences of metastatic lesions. Prior to the first stage, cortisone was given by mouth, with sodium chloride and DOCA. Glucose and water were given intravenously. After surgery transfusions and ambulation were restricted at first. Electrolyte imbalance was common. Fifty milligrams of cortisone were given daily in two doses, as a maintenance regime.

In a case of prostatic carcinoma with osteoblastic metastases to the vertebrae and bony pelvis, adrenalectomy not only relieved pain but cleared the skeletal picture considerably.

The authors concluded that in an unselected series of cancer cases one fifth were benefited objectively and subjectively. With a selected series, the possibility of better results was considered. The major problem was permanent cortisone substitution therapy postoperatively. Experimental evidence indicated that the liver counteracted gonadotropic adrenal steroids and their cancerogenic influence.

Achieving deviation of adrenal venous return through the portal circuit was the authors' plan. It was accomplished following right adrenalectomy by transplanting the left adrenal into the spleen after interrupting its venous return and sparing the arterial and nerve pedicle. Subsequent to animal experimentation, two such procedures were successfully attempted in women suffering from advanced breast cancer. Substitution therapy was not needed and pain was relieved. Thus the benefits of adrenalectomy were gained without the usual unfavorable and demanding postoperative course.

—Henry Ritter, Jr., M.D.

Preoperative Estimation of Renal Function. JACK LAPIDES and JOHN M. BOBBITT. *J. Am. M. Ass.*, 1958, 166: 866.

THE AUTHORS discuss the value of a 15 minute or fractional phenolsulfonphthalein (PSP) test in fulfilling the requisites for a simple rapid renal function test. In preoperative evaluations the blood urea nitrogen, nonprotein nitrogen, and serum creatinine levels are commonly used. These are entirely inadequate for renal appraisal since extrarenal factors, including dehydration and liver disease, may influence the urea readings. The most important shortcoming is the inability of these readings to detect kidney function impairment until actual "uremia" with reduction of the glomerular filtration to less than 25 per cent of normal occurs.

Urea and creatinine clearances measure glomerular function. The phenolsulfonphthalein test measures tubular function primarily. Since the efferent arteriole of the glomerulus is the main source of nutrition for the tubular cells it would appear that any disease state compromising the glomerular blood vessels would also affect the tubules. With the tubule dependent upon the glomerulus for blood supply, the function of the tubule, expressed by PSP clearance, can rarely be better, comparatively, than the function of the glomerulus as demonstrated by the associated urea or creatinine values. From a theoretical point of view an excellent fractional PSP clearance implies an excellent urea or creatinine clearance, while a poor PSP excretion may be associated with urea and creatinine clearances varying from poor to excellent.

The 15 minute PSP clearance test is described. To determine its value in estimating renal function and to correlate it with the clinical methods of measuring glomerular filtration (urea and creatinine clearances), experiments were conducted on 350 patients. All patients were subjected to both types of renal function testing. Urea clearances of 70 per cent or more and creatinine clearances of 130 liters or more per 24 hours were considered arbitrarily as being 100 per cent of

normal glomerular function. Urinary excretion of 33 per cent or more of the injected PSP dye in 15 minutes was designated as being 100 per cent of normal tubular function.

The results are graphically presented with the PSP percentages plotted along the abscissa and the urea or creatinine clearances along the ordinate. In some patients the urea and creatinine clearances were equal to the PSP value, but in no patient was the PSP value better. Tubular function as measured by the fractional PSP test bears a certain definite relationship to glomerular function as measured by urea and creatinine clearances.

Thus, a moderately good PSP clearance means moderately good renal function without further clearance studies. A poor PSP clearance must always be followed by a creatinine or urea clearance study because good glomerular function may frequently be found with poor tubular function as in primary tubular disease. In screening a patient for operation a PSP excretion of 15 per cent or more in 15 minutes is adequate. If the excretion is less than 15 per cent it is necessary to run the urea or creatinine clearance test since the glomerular function may be much better than the tubular and may permit operation.

—*Allan K. Swersie, M.D.*

Rupture of the Kidney; a Clinical Study (Fracturas de riñon; estudio clínico). J. L. Inclán Bolado and J. Corral Castanedo. *Arch. españ. urol.*, 1957, 13: 135.

After reviewing the literature on traumatic lesions of the kidney, the authors reported on 19 cases of rupture of the kidney studied in their General Surgery Service in Burgos, Spain.

The most frequent causes of trauma included: fall from a height, fall in the street, fall from a bicycle, the kick of a horse, and automobile accidents.

In 11 cases the kidney was the only viscus injured; in the remaining 8 cases there were associated lesions such as rupture of the spleen (2 cases), rupture of the spleen and rib fracture (1 case), rupture of the lung (1 case), rupture of the lung and bowel (1 case), fracture of the ribs (1 case), fracture of the skull and rib (1 case), and rupture of the lung and fracture of the skull and rib (1 case).

There were no fatalities among the patients with isolated lesions of the kidney. Seven of these patients were treated conservatively; 2 underwent nephrectomy and the other 2 had nephropexy. The criteria for conservative treatment were based mainly on the progress of hematuria, vital signs, and intravenous pyelography. Nephrectomy was performed when the kidney had extensive and deep traumatic fissures.

There were 4 deaths in the group of patients with associated lesions, 3 of whom had ruptures of a lung.

—*Mansur Taufic, M.D.*

Intermittent Obstruction at the Ureteropelvic Juncture. David Falk. *J. Urol.*, Balt., 1958, 79: 16.

The author states that there is a type of temporary hydronephrosis caused by intermittently recurrent obstruction at the ureteropelvic juncture; between attacks of obstruction there are usually no symptoms, or only minimal symptoms and the pyelographic findings are those of a normal upper urinary tract.

He advocates pyelographic study during an acute attack of the hydronephrosis in order to make a diagnosis. Intermittent ureteropelvic obstruction is usually caused by aberrant vessels, but in several of his cases, intrinsic ureteropelvic stenosis was the only finding.

The author urges careful history-taking; repeated attacks of true renal pain in adults and repeated attacks of nonlocalizing "intestinal colic" in children, plus normal laboratory findings, should suggest intermittent ureteropelvic obstruction. Whenever the attack occurs, a pyeloureterographic investigation should be instituted.

A differential diagnosis must be made from ball-valve renal pelvis calculus, blood clot, symptomatic nephroptosis with ureteropelvic kinking, and extrinsic disease such as cholecystitis, duodenal ulcer, appendicitis, coronary occlusion, and acute low back syndrome. In the surgical treatment, a search for intrinsic ureteropelvic stenosis should be made even if an aberrant vessel is found. —*David Rosenbloom, M.D.*

BLADDER, URETHRA, AND PENIS

Total Mucosal Denudation of the Canine Bladder; Experimental Observations and Clinical Implications; Final Report. Arnold R. Sanders, Clarence J. Schein, and Lazarus A. Orkin. *J. Urol.*, Balt., 1958, 79: 63.

The authors performed total vesicomucosal denudation upon 8 dogs by raising a small submucosal wheal with saline solution and extending the injection until the mucosa was converted into a large bulla, after which the mucosa was completely stripped from the underlying detrusor muscle to the bladder neck. A new uroepithelium derived from the ureteral and urethral stumps relines the bladder within 16 weeks, there is no diminution of bladder capacity, and if a small cuff of periureteral vesical mucosa remains, no postoperative reflux and upper urinary tract dilatation need occur.

The authors believe that total mucosal denudation might be applicable to the human being with recurrent multiple papillomas of the bladder or multiple papillomatosis. All present methods of treatment of papillomatosis—excision, fulguration, radium implantation, podophyllin, external radiation, and intravesical isotope irradiation—leave much to be desired as to recurrence, radiation and treatment, cystitis, and bladder contracture. It is to be hoped that when this new denudation technique is applied to the human being it will result in a newly proliferated uroepithelium which is more resistant to neoplasia. —*David Rosenbloom, M.D.*

Inguinal Hernia of the Urinary Bladder (Hernia vesical inguinal). A. Puigvert. *Arch. españ. urol.*, 1957, 13: 85.

Hernia of the bladder represents one per cent of the inguinal hernias. It usually occurs in elderly people, and its main cause is prostatic obstruction. In untreated cases, the distended bladder may eventually find its way through the inguinal orifice. In most instances there is a peritoneal sac with intestinal content, the bladder being located extraperitoneally. Exceptionally, as in the case reported by the author

FIG. 1 (Puigvert). Left, cystogram showing the herniated portion of the bladder extending down into the scrotum.

FIG. 2. Right, postoperative cystogram showing the bladder in its normal position.

in the present article, the bladder and the preperitoneal fat are the only constituents of the hernial mass.

The patient was a 77 year old man with prostatic hypertrophy and a right inguinal hernia of long duration. The presence of the bladder in the hernial sac was revealed by urinary catheterization and cystography (Fig. 1). At operation no peritoneal sac was found; the hernial mass was represented by a large diverticulum of the bladder and preperitoneal fat which were located in the spermatic cord. After resection of the preperitoneal fat, the bladder was dissected free from the elements of the spermatic cord and was then reduced into the pelvis. The inguinal wall was repaired by the Bassini technique.

Ten days after the herniorrhaphy, a prostatic adenoma was removed through the perineal approach. A postoperative cystogram showed the bladder in its normal position (Fig. 2).

—*Mansur Taufic, M.D.*

Unusual Evolution of a Fibroma of the Urinary Bladder (Rara evoluzione di un fibroma della vescica). LUCIANO DELZOTTO and SERGIO GODENA. *Urologia*, Treviso, 1957, 24: 499.

THIS INSTANCE of a fibroleiomyoma is reported because of the rarity of this type of neoplasm and because of its interesting clinical course and symptoms.

The patient was a 28 year old man with a lengthy history of pulmonary tuberculosis, who began to suffer from urinary symptoms 6 months previously. There had been difficulty in initiating micturition, pollakiuria of nocturnal type, and burning on urination. Two or 3 days before the patient was seen he had noted a mild hematuria.

Cystoscopy disclosed a moderately distended bladder with mild trabeculation. Attached to the upper border of the vesical neck was a spherical mass with a short pedicle. It partially obstructed the internal orifice of the urethra. It was removed through a suprapubic opening.

Fibroleiomyoma of the urinary bladder is a rare condition; about 97 cases have been reported. Still more rare is such a tumor at this location. Its significance is that the symptoms may be erroneously referred to a prostatic condition, particularly the so-called adenoma of the anterior lobe of the prostate.

—*John W. Brennan, M.D.*

Clinical Impressions in 100 Consecutive Cases of Carcinoma of the Urinary Bladder Treated by Supervoltage. CARLO A. CUCCIA, SID JONES, and CECIL M. CRIGLER. *J. Urol.*, Balt., 1958, 79: 99.

CORDONNIER AND SEAMAN, in 1956, concluded that betatron therapy was not successful in treating deeply infiltrating carcinoma of the bladder. However, it was useful in early cases in which surgery was contraindicated, or for palliation in inoperable cases. Many believe that supervoltage therapy should be limited to superficial anaplastic growths. Bladder wall penetration and grading of the lesion are the basis of prognostic classification of bladder tumors. Such a classification must be made of bladder tumors treated by irradiation or by surgery to draw comparable conclusions of the results. A combination of endoscopic findings, with biopsy and bimanual examination, is essential for grades A, B_1 and B_2. In stage C, the tumor may involve the entire bladder wall, the perivesical fat, the prostate within its capsule, and the vesical ligaments *without reaching the pelvic wall*. Lymph

node metastases within the pelvic bone, with extravesical extension reaching the pelvic wall, belong to stage D_1. Pelvic node metastases exceed a 60 per cent incidence in extravesical cancer of the bladder. Distant nodal and visceral metastases are classified as stage D_2.

At the M.D. Anderson Hospital, Houston, Texas, superficial bladder cancers were treated transurethrally. For all other bladder tumors irradiation was given preference. The authors aimed to treat the whole empty bladder. External radiation was preferred, based on Baker's demonstration of circumferential lymphatic spread of cancer cells within the bladder wall. The presence of malignant cells in the bladder wall lymphatics with more than 50 per cent of the bladder wall circumference involved called for radical therapy by surgery or irradiation. Supervoltage permits greater depth of penetration with skin-sparing effect, as compared with standard x-ray therapy. Continuous therapy tolerance is better with milder local reactions, particularly those of the urinary tract. Complications are reduced. With the betatron, better volume distribution can be achieved. Late fibrosis of subcutaneous suprapubic tissues was observed in patients treated by cobalt^{60}, so this modality is now reserved for anterior bladder wall lesions with prevesical space extension. The energy level is the same with both types of irradiation.

Six thousand roentgens in 5 weeks via a 3 field arrangement were the minimal tumor dose. One anterior suprapubic field was coupled with two posterior fields at the level of the sacroiliac joints. The portal size and degree of angulation were varied in the posterior fields to cover the tumor site. The fields were loaded, 2 to 1 in favor of the anterior portal, to get better distribution and spare the rectum. In the presence of prior suprapubic surgery, the minimal dose was reduced to 5,500 roentgens.

Pneumocystograms were taken to localize the beam and map volume distribution. No attempt was made to cover the pelvic nodes. For palliation, the dose was 3,500 to 4,500 roentgens through 2 or 4 portals.

Follow-up cystoscopy was performed after 1 week, and then at 1, 3, 6, and 12 month intervals to study both bladder reaction and the accuracy of x-ray localization. Erythema, bullous edema, and pseudomembrane formation were observed with telangiectasia.

Dysuria and urgency during treatment were related to the pre-existing pathology. Previous irradiation is a limiting factor. A definite relationship was established between recent prostatic or bladder surgery and post-irradiation bladder contracture. Cystitis, bladder neck obstruction, and urethral stricture decreased the local tolerance to irradiation. Bladder surgery after irradiation was characterized by slow healing. Frequency of urination usually increased by the second week of treatment with bladder ulcer and contracture not uncommon. Rectal symptoms included burning, bleeding, mild tenesmus, and diarrhea. Mild generalized malaise and anorexia were encountered. Complications were more common in the older females in the series presented. Symptoms usually subsided in 4 to 6 weeks. The authors think that preirradiation urinary diversion is indicated in the presence of interstitial cystitis, contracture of the bladder, and bilateral ureteral obstruction.

One hundred consecutive cases of bladder tumor treated by supervoltage are reported; 82 per cent of the patients were males; 64 per cent received radical therapy and 30 per cent palliation. Two-thirds of the patients were treated on the betatron and one-third with cobalt^{60}. Seventy-three per cent of the tumors were transitional cell cancers, 14 per cent squamous cell neoplasms, and 4 per cent adenocarcinomas. The higher grade lesions (66 per cent) were more deeply infiltrated and showed a higher incidence of metastases. Radical therapy was given to superficial anaplastic lesions, to those with deep infiltration, and to a few patients with metastases. Palliation was reserved for distant metastases, advanced pelvic disease, and for patients with less extensive disease and a poor general condition. The potential of the bladder mucosa to form new, superficial, low grade lesions is best treated by transurethral surgery, since the lesions are not eradicated by irradiation. High grade lesions should receive radical therapy. Recurrences increasing in size and grade can be best treated by irradiation.

—*Henry Ritter, Jr., M.D.*

The Surgical Treatment of Carcinoma of the Bladder. HUGH J. JEWETT. *J. Urol.*, Balt., 1958, 79: 87.

THE AUTHOR states that the curability of bladder cancer decreases as the depth of invasion of the bladder wall increases, despite the type of treatment employed. Although he feels that cystectomy may well lead the way to a more permanent cure in all cases of bladder tumor, the price is too exorbitant if another treatment can be found. It is often difficult to decide between simple or extensive treatment as one may be "ineffectually conservative" and the other "excessively radical." The establishment of potential curability is not considered easy; if the carcinoma lies high, the bladder should be salvaged and the disease

TABLE I.—CLASSIFICATION OF PRIMARY TUMORS OF THE URINARY BLADDER

		Histologic pattern						
		Grade of malignancy						
	Maximum depth of infiltration	*Low grade (1–2)*			*High grade (3–4)*			
Level of bladder wall	*(stage)*	*Trans. cell (papillary)*	*Epidermoid (squamous)*	*Trans. cell*	*Epiderm.*	*Unclff. (anaplastic)*	*Adenocarcinoma*	*Miscellaneous*
Mucosa	O							
Submucosa	A							
Superficial muscle	B_1							
Deep muscle	B_2							
Perivesical fat	C							

eradicated; if low, palliative treatment should be given.

In the Johns Hopkins Hospital (Baltimore, Maryland) study, cellular differentiation was only 50 per cent accurate in assessing cure potential. The relationship of curability to the depth of bladder wall infiltration was found to be more accurate. A higher incidence of metastasis was present when penetration was deeper. The association of large deep wall tumors with the presence of numerous vascular channels in this region increases the chance for vascular invasion with metastasis. The histopathology of the infiltrating tumors could not be correlated with the depth of bladder wall penetration. Tumors of similar types were found in both superficially and deeply infiltrating groups. "Cellular appearance alone indicates neither the presence nor the absence of metastasis or local extension." The "grade of malignancy, as a measure of its 'speed,' aids in assessing its lethal potential." Penetration of the bladder wall is said to occur faster with more highly graded malignant conditions. Jewett, in 1944, noted a greater incidence of metastasis with deeper bladder wall penetration, and in 1947 believed that the halfway mark in the muscularis was the point of infiltration at which potential curability diminished abruptly. This did not mean that metastasis could not occur at any stage of infiltration.

The preoperative assessment of potential curability is emphasized. Identification of superficial or deep tumors is desirable and possible with deep biopsy of the bladder wall beneath the tumor and bimanual pelvic examination. The absence of induration in an accessible area usually indicates superficial invasion. This combination of stage of infiltration, histologic picture, and grade of malignancy forms a classification indicating potential curability or lethal capacity. Thus, more effective measures may be indicated with avoidance of unnecessary radical surgery. Limiting factors in treatment include the tumor itself, the procedure which is selected, and the factors imposed by the operator's method of application of the procedure.

The author compares 71 cases of segmental bladder resection with 54 simple cystectomies. With infiltration up to the halfway mark in the muscularis, 70 per cent of the patients lived 5 to 14 years after partial cystectomy, while with total cystectomy 50 per cent survived. In the more deeply infiltrated group, 8.3 per cent with partial cystectomy survived 5 or more years as compared to 9 per cent with total cystectomy. Renal damage was believed to have accounted for the loss of 14 per cent of the patients who underwent total cystectomy. Improved methods of urinary diversion are suggested to increase the survival rate of this group.

A survey of the postoperative results reported by Milner, Nichols, Flocks, Whitmore, and Marshall with follow-up periods of 3 to 5 years is presented. Although techniques ranged from closed electroexcision to radical cystectomy, Jewett noted the best results followed simple procedures. Extensive operations were often used for cases that were obviously unsuited to conservative treatment.

—Henry Ritter, Jr., M.D.

Carcinoma of the Female Urethra. C. Bernard Brack and Robert J. Dickson. *Am. J. Roentg.*, 1958, 79: 472.

Carcinoma of the female urethra is a relatively rare disease. Two types are described. The more common, the "vulvourethral," usually arises at the urethral meatus from the junction between the transitional epithelium of the urethra and the stratified squamous epithelium of the vulva. The second and less common type, the "urethral," arises from the mucosa of the upper urethra. The majority of workers consider that both of these types are true urethral carcinomas.

The vulvourethral type usually begins as an ulcer at the urethral meatus, often resembling a caruncle, and extends along the mucous membrane of the vestibule. In later stages it is indistinguishable from carcinoma of the vulva. The urethral type arises directly from the urethral mucosa somewhere above the meatus, and usually infiltrates the deeper tissues more rapidly with enlargement and induration of the urethra. Both types have been found to metastasize to the inguinal lymph nodes.

Chronic irritation is an important etiological factor. The symptoms are tabulated, frequency and dysuria being the most common complaints in the 14 cases reported. Biopsy of all suspicious lesions at the meatus is stressed.

The results of treatment, which includes surgical procedures, irradiation, and combined methods, are generally poor. In a series of 12 cases presented by Counseller and Patterson in 1933 the highest percentage of 5 year cures was obtained in cases treated both with radium and roentgen rays. The authors summarize the treatment and results of therapy in their own 14 cases. The details of their radium and roentgen techniques are discussed. Surgical procedures were performed in instances in which there was doubt that the carcinoma was cured by radiation therapy and it was advisable to excise the urethra and vesical neck and attempt ureteral transplants to the colon. In 5 instances it was necessary to excise radiation ulcers of the labium.

Eleven of the 14 patients have been observed for more than 5 years to date and are well—a 54 per cent 5 year cure. The remaining 3 patients, who were treated less than 5 years ago, also remain well.

—Allan K. Swersie, M.D.

Free Grafts of Mucosa from the Urinary Bladder for Construction of a Urethra in Human Being and for Production of Bone in Dogs. Victor F. Marshall and Robert M. Spellman. *Plastic & Reconstr. Surg.*, 1957, 20: 423.

This article deals in its first section with the use of urinary bladder mucosa for construction of a urethra in human beings. During the development of this method, several investigators reported upon the production of bone in the subcutaneous tissues of dogs by burying free autografts of vesical mucosa. To determine the significance of this finding in relation to the use of such vesical tissue in their new method of hypospadias repair, a study was conducted and described in the second section of the article on the use of free urinary bladder mucosal grafts for production of bone in dogs.

I.

The mucosal strip (with submucosa) used in urethral construction is obtained by exposure of the bladder dome and separation from the muscularis by blunt dissection. The graft is trimmed and fashioned into a cylinder around a latex catheter with the mucosal side to the inside. A midline incision from the hypospadiac meatus is made backward to expose at least 2 cm. of the normal urethra. The technique of tunnelling through subcutaneously to the glans from this level and pulling through the tip of the splinting catheter and overlying graft is described. At this time anastomosis of the graft to the urethral roof is initiated with about three sutures of No. 00000 chromic catgut. The proximal end of the splinting catheter is drawn out through the cystostomy site and the anastomosis completed with more suturing. The reader is referred to the original text for important details of this method, which is preferred over a previously used end-to-end anastomosis.

The results obtained in the first 39 consecutive cases are presented in 3 groups of 13 each and the complications for each type described. In the first group the anastomosis of the graft was end-to-end. In the second group the graft was anastomosed to the dorsum of the urethra as described, but small catheters were used for splinting. In the third group of 13 patients there was a progressive tendency to use considerably larger catheters up to number 26F or 28F caliber and to cut a wider subcutaneous tunnel. There were fewer complications in this group and 11 patients are considered to have satisfactory results. The hypospadiac meatus was located on the shaft in 3 cases, at the penoscrotal area in 23, and in the perineum in 13. The method compares favorably with previous experience but needs further improvement.

II.

In an investigation with studies similar to those presented in this article, Huggins in 1931 reported on bone production in dogs following autografting of bladder epithelium buried in the vicinity of the rectus sheath. It was suggested then that proliferation of transitional cells was essential to this type of osteogenesis. These studies indicate that such proliferation is not essential. The autografted urothelium appears to secrete a serumlike fluid which induces osteogenesis (not calculus formation) when in contact with connective tissue.

The experiments basically deal with findings of bone formation when the epithelial surfaces were placed in direct contact with the rectus abdominis muscle, as contrasted with failure to form bone when the muscle or fascia tissue was not directly exposed to the secreting transitional cell surface.

Adult mongrel dogs were used as experimental subjects. In the first series of experiments 19 autografts were placed with the epithelial surface in contact with the rectus muscle. At the end of 2 months bone developed in the tissue apposed to the transitional cell surface. This experiment was repeated in 19 cases with the submucosa surface in contact with muscle. The bone formed on the opposite side in the tissues in contact with the urothelium.

In 17 cases the autografts were molded into complete spheres with the epithelial surfaces facing the interior and not in contact with the rectus sheath. No bone formed, but within the spheres cysts, which were distended with fluid similar to canine serum, were formed. In 3 instances, grafts were fashioned as spheres with the transitional cell surfaces facing externally. Bone formed in the tissues directly contacted.

Three autografts prepared as epithelial-lined tubes open at each end were placed under the rectus fascia so that the secreting fluid was permitted access to the connective tissue. In these instances bone formed at the ends of the graft. When the epithelial surface was placed externally in 3 other cases, directly in contact with connective tissue, bone formation occurred along the entire length of the graft.

Specifically correlated to the successful use of vesical mucosal grafts in the formation of the urethra is the observation that the construction of epithelial-lined tubes with both open ends draining externally resulted in no osteogenesis.

The article is generously supplemented with clarifying illustrations and histological photomicrographs.

—*Allan K. Swersie, M.D.*

GENITAL ORGANS

Behavior of the Acid and Alkaline Phosphatases and Nucleic Acids in the Prostate of the Rat and Their Variations Under Hormone Treatment (Comportamento delle fosfatasi acida e alcalina e degli acidi nucleic nella prostata ventrale di ratto e loro variazioni sotto trattamento ormonale). UMBERTO COMUZZI and PAOLO CAPACCI. *Urologia*, Treviso, 1957, 24: 462.

IN THIS COMMUNICATION the authors report their attempts to determine whether there is a parallelism of behavior between quantitative variations of the alkaline and acid phosphatases and of the nucleic acids. They take for granted that there is some relation between the metabolism of the nucleic acids and protein synthesis and hope to add some light on the action of estrogen and androsterone on this process.

The experimental animals were Wister rats. Eighteen were divided into 3 groups of 6 each. The first group was used as a control; the second group was treated with an estrogen, and the third with testosterone proprionate. After several days the anterior lobe of the prostate was removed and sections were stained for alkaline and acid phosphatases (method of Gomori), for ribonucleic acid (method of Brachet, using the procedure of Pasquinelli-D'Alessandro), and for desoxyribonucleic acids (Feulgen-Schiff). The results are shown in 14 photomicrographic reproductions.

These photomicrographs show that in the untreated animal the alkaline phosphatase was deposited predominantly in the basal membrane of the acini, in the nuclei of the epithelial cells, in the epithelium of the small vessels, and in the sheaths of the muscle fibers. In sections from the animal which had received estrogen injections no evidence of alkaline phosphatase was present. In sections from the animal which had received testosterone the alkaline phosphatase was markedly increased in amount, and was present and demonstrable in the cytoplasm of the epithelial cells.

In the normal rat the acid phosphatase was observed only in the glandular epithelium, and more in the

nucleus than the cytoplasm. In the animals treated with estrogen it had completely disappeared. In the animals treated with testosterone there was more acid phosphatase than normal in the cytoplasm of the epithelial cells; it was also present in the basal membrane and in the epithelial cells of the vessels of the stroma.

In the normal rat ribonucleic acid was present in the cytoplasm of the epithelium and was pronounced in the nucleoli. In animals treated with estrogen there was a definite rarefaction of the granules in the cytoplasm and a perinuclear halo. In the prostates of rats treated with testosterone the precipitation was very intense as compared with that in control animals, and it was more or less uniformly distributed.

In untreated rats desoxyribonucleic acid was present in discrete quantities in the nuclei of both epithelial cells and stromal cells. In animals treated with estrogen and with testosterone the acid content in the cellular nuclei was more marked than in the untreated animals; in the nuclei of the stromal cells of the animals treated with estrogen the difference was marked.

Apparently there are variations in the alkaline and acid phosphatases in animals treated with the sexual hormones and these variations are paralleled by the nucleic acid content. —*John W. Brennan, M.D.*

The Management of Testicular Tumors. WILLIAM J. STAUBITZ, IMRE V. MAGOSS, OSCAR J. OBERKIRCHER, MELBOURNE H. LENT, FRED D. MITCHELL, and WALTER T. MURPHY. *J. Am. M. Ass.*, 1958, 166: 751.

THE RESULTS of treatment in 283 cases of testicular tumors were studied at Roswell Park Memorial Institute (Buffalo) between 1922 and 1956. In 1948 Sauer reviewed the treatment of the first 202 cases by irradiation and orchiectomy alone. After World War II radical retroperitoneal lymph node dissection was employed in addition to roentgen therapy and orchiectomy in 59 cases of germinal tumors other than seminomas. Roberts (1901) and Hinman (1916) reported the earliest such node dissections in this country, but poor end results discouraged widespread usage of this technique. Recently Lewis (1948), Cahill (1951), and Kimbrough (1953) reported favorably on the triple therapy of orchiectomy, irradiation, and retroperitoneal lymphadenectomy. In 1946, Friedman and Moore, while studying 922 testicular tumors, classified four fundamental histological types: seminomas, embryonal carcinomas, teratocarcinomas, and choriocarcinomas. Mixtures were also noted and the prognosis was determined on the basis of the most malignant element found in any combination.

The most common local symptom was gradual painless enlargement of the affected testis. Discomfort occurred as the increased weight of the testis caused traction on the spermatic cord. The enlarged testis was usually hard and of variable size and contour. The epididymis and spermatic cord were not usually involved and could be palpated separately. Inguinal adenopathy could be present in advanced cases. The prognosis became guarded with distant signs and symptoms such as left supraclavicular adenopathy, back pain, weight loss, and anorexia. Abdominal mass resulted from matted, enlarged nodes, and metastatic pulmonary symptoms were common. Abdominal examination, regional lymph node palpation, and chest roentgenograms were vital for diagnosis. At excretory urography, ureteral blockage or displacement by retroperitoneal node involvement, with possible resultant hydronephrosis, was often found. The differential diagnosis was difficult with thick-walled hydroceles, nonspecific epididymo-orchitis, and tuberculosis of the testis. Diagnostic biopsy was contraindicated.

In this detailed review, 51 per cent of the cases had metastases with 32 per cent to the para-aortic nodes, 22 per cent to the lungs, 13 per cent to the left supraclavicular nodes, and 8 per cent to the mediastinum. Forty-three per cent of these patients demonstrated metastases less than 6 months following their first symptoms. Lymphatic spread might occur along the spermatic cord into the common iliac and para-aortic chains with involvement of mediastinal, supraclavicular, and renal pedicle nodes. Blood-borne metastases were infrequent, but could be found in the lungs, liver, adrenal glands, kidneys, pancreas, brain, and bones. Metastases were usually similar in type to the primary lesion and were commoner with the more anaplastic growths.

Therapy was based on the structural pattern, the biological behavior, and the presence of metastases. Prompt excision of the primary lesion was always indicated, with a high inguinal incision and en bloc removal of the testis and cord. Inadequate irradiation or surgery gave poor results. Routine regional lymph node excision was advised in all these cases. The criteria for radical retroperitoneal node dissection included histological identification of embryonal carcinoma, teratocarcinoma, or choriocarcinoma, without evidence of widespread metastases. If lymphatic metastases were found to be present above the renal pedicle, the case was considered inoperable. Dissection was best performed through a transthoracic incision with unilateral node removal under vision about the renal pedicle, spermatic vessels, and great vessels, down to the internal abdominal ring.

Postoperative radiation was given to all patients. Seminomas received 3,000 roentgens in 19 to 23 days, whereas the other germinal tumors received from 5,000 to 5,500 roentgens in 38 to 52 days. The tumor dose increment depended upon thickness of the body and quality of radiation, as well as number, size, and angulation of the fields. When there were no demonstrable metastases, prophylactic irradiation to the upper abdomen was done first, with lower abdominal therapy following. With metastases, the secondary lesions were treated first, followed by lower abdominal therapy. The dosage depended on the histologic diagnosis and depth of the tumefaction. Even inoperable patients received palliative radiotherapy. Lower field irradiation was better tolerated than radiation to the upper field; therefore the amount given to the lower field could be greater. Postirradiation complications commonly included kidney damage.

In this series, there was 37 per cent of seminomas with a 64 per cent 4 year survival rate after orchiectomy and irradiation. Of the embryonal carcinomas (31 per cent), one-third were considered operable, and after 4 years, 83 per cent of the patients undergoing irradiation, orchiectomy, and node dissection were

living, as opposed to 32 per cent subjected to orchiectomy and irradiation alone. Twenty-nine per cent had teratocarcinomas, 60 per cent of which were operable. A 70 per cent 4 year cure rate with triple therapy was noted, as opposed to a 44 per cent survival with only orchiectomy and irradiation. Among the 3 per cent of choriocarcinomas, none were found operable. A comparison of the clinically operable cases in this series with those of Sauer revealed an increase in the 4 year survival rate from 54 to 74 per cent with the addition of retroperitoneal node dissection to orchiectomy and irradiation of germinal testicular tumors other than seminomas. —*Henry Ritter, Jr., M.D.*

MISCELLANEOUS

The Value of Clearance Tests on Split Urines in the Indications for Operation in Renal Disease (Die Bedeutung der Clearanceuntersuchung getrennter Nierenharne fuer die Operationsindikation bei chirurgischen Nierenerkrankungen). S. Bettge and C. F. Rothauge. *Zschr. Urol.*, 1957, 50: 544.

The value of clearance tests in renal diseases as a guide to the prognosis and therapy is well established. These tests, although frequently referred to in the medical literature, are less often discussed in surgical papers. In unilateral renal diseases requiring surgery, the question often arises if the function of the remaining kidney is adequate to support life. If both kidneys require surgical correction, the decision which of the two functions least and should be operated on first, must be reached. Clearance tests on split urines can be of value in such decisions. These tests were evaluated in the following manner.

The patient was given 600 c.c. of tea one-half hour before the examination. In addition, he was given 10 c.c. of a 20 per cent solution of P.A.H. (nephrotest Casella). The determination of the total glomerular filtrate was estimated by the clearance of the endogenous creatinine.

To perform the clearance test the following technique was utilized. After the introduction of the cystoscope, a Garceau catheter was advanced 10 to 12 cm. in the ureter of the good kidney. This shut out any flow from that kidney, and whatever urine there was in the bladder, by necessity, came from the other kidney. After the injection of the P.A.H., three separate specimens, 2 minutes apart for a period of 20 to 80 minutes, were examined. To estimate the P.A.H. and the clearance, the formula $C=\frac{U.V}{P}$ is used. U stands for the concentration of the P.A.H. in the urine; V equals the amount of urine per minute, and P equals the concentration of the P.A.H. in the plasma. In normal kidneys, creatinine clearance amounts to 120 to 160 c.c. per minute. The P.A.H. clearance is apt to be 500 to 800 c.c. per minute; i.e., each kidney clears creatinine in the amount of 60 to 75 c.c. per minute, and P.A.H. in 200 to 240 c.c. per minute.

An error in the computation of the clearance of P.A.H. may occur in some patients, if this substance is held up in a very dilated hydronephrotic kidney.

The results and the helpfulness of the clearance tests are presented in a series of 18 case reports. When renal disease demands nephrectomy, it is always important to find out if the remaining kidney can sustain life. In diseased kidneys which do not require nephrectomy and can be salvaged, it is important to ascertain whether such a kidney has sufficient function to make the salvage worth while, because a kidney whose function is less than one-sixth normal is not worth retaining. In cases of hypertension due to unilateral renal disease, clearance tests may be useful in determining the functional ability of the involved kidney. The results of the clearance tests should be checked against intravenous pyelography and methylene blue excretion tests.

The clearance tests on the split urines are more sensitive in the determination of the functional ability of each kidney than most methods utilized for this purpose. These tests permit a quantitative estimation of the functional ability of each kidney and of the total renal mass. The authors' investigations have shown that a kidney in which function has become one-fourth or one-fifth of normal may still show fairly concentrated excretion of methylene blue and fairly good concentration of the intravenous pyelographic medium. Renal clearance tests, therefore, are a useful method for estimating renal function in bilateral renal disease. This method has been used in 18 patients.

—*S. Richard Muellner, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Giant Cell Tumor of Bone. VERNON R. GEE and DAVID G. PUGH. *Radiology*, 1958, 70: 33.

THE AUTHORS' STUDY includes 104 lesions. The distribution of the lesions is tabulated. The history of trauma was too inconstant to be considered an etiologic factor.

There are 12 figures throughout the article which elucidate the text.

A typical roentgenogram revealed an expanding area of rarefaction situated eccentrically in the end of a long bone in a young adult. There were many exceptions to this description.

Expansion was absent or only questionably present in 23 per cent of the cases. The tumor was centrally located in 22 per cent. Sixty-five per cent of the patients were classed as young adults.

The most constant element in the description was location in the end of the involved bone. There was a lack of correlation of the initial roentgenogram with the course of the disease after treatment and with the variation in microscopic features.

—Richard J. Bennett, Jr., M.D.

Rhabdomyosarcoma; a Clinicopathological Study and Classification of 39 Cases. ROBERT C. HORN, JR. and HORATIO T. ENTERLINE. *Cancer*, 1958, 11: 181.

A REVIEW of 39 cases of rhabdomyosarcoma is presented in detail. A preliminary discussion points out that this tumor group includes some growths which have not been included heretofore: embryonal, polypoid or botryoid, and alveolar. The classical type is designated as pleomorphic rhabdomyosarcoma. The authors point out that cross and longitudinal striations may be found in many of these tumors if painstaking examination is made and if the preparations are of good technical quality. Grossly the tumors vary in appearance except for the botryoid tumors which take the form of edematous grapelike masses.

Microscopically there is some overlap in the different types. The pleomorphic type has a constant appearance; it is a spindle-cell tumor distinguished from fibrosarcoma by its cellularity and pleomorphism. The pleomorphic cells are: (1) broad straplike cells with multiple nuclei in tandem; (2) bright eosinophilic synctiumlike masses, with multiple nuclei, and (3) vacuolated spider cells. The cells with abundant cytoplasm usually have the longitudinal myofibrils and less often the cross striations. The authors state: "When the latter are undeniably visible and traverse the full width of the cell, the diagnosis of rhabdomyosarcoma is beyond question."

The alveolar type is characterized by "alveoli" separated by connective tissue trabeculae.

The embryonal rhabdomyosarcoma is characterized by solid areas of spindle cells or round cells with a single nucleus.

Botryoid rhabdomyosarcoma occurs in polypoid masses covered by mucous membrane beneath which is a multilayered band of cells characteristic of this tumor.

A clinical assessment of the types of sarcoma is presented according to age, sex, site, duration prior to diagnosis, survival, and incidence of cross striations. The pleomorphic group is essentially one of adults. The alveolar rhabdomyosarcoma affects primarily adolescents and young adults. Both the embryonal and botryoid types affect children and infants. Male patients predominated in all groups except the alveolar type in which the incidence was divided equally between the sexes.

The site of origin in the pleomorphic group was essentially the limbs. The alveolar group was divided evenly between limb, trunk, and soft tissues of the head and neck. The embryonal group involved the head and neck with 5 being orbital. The botryoid tumors arose in various parts of the head and neck.

Among 39 patients, one was lost to follow-up, 31 died of the tumor, and 7 have survived. Twenty-three patients had metastases and in 15 instances the lungs were involved.

Of the 7 patients surviving, 3 have been traced for too short a period. The other 4, 3 with embryonal and 1 with a botryoid sarcoma, have been traced for periods ranging from 19 months to 12 years. All were treated promptly with aggressive surgery. In another series reported, aggressive measures resulted in a considerable number of 5 year "cures".

In 4 cases there was a history of trauma.

Radiation may offer some help in the embryonal and botryoid rhabdomyosarcomas.

—Richard G. Saxon, M.D.

Bilateral Tuberculous Arthritis of the Hip Joint (La coxalgie bilatérale). YVES COTREL. *Sem. hôp. Paris, Ann. chir.*, 1957, 11: 1733.

FIVE CHILDREN with bilateral hip joint tuberculosis have been observed since 1952. This number comprised 2 per cent of 150 cases of tuberculous coxalgia seen during this same period. Three of these patients had relatively advanced processes, all of which developed into ankylosis of both joints. Two cases were diagnosed relatively early and streptomycin treatment (systemic and intra-articular) was started immediately. In one of the 2 last-mentioned patients one of the hip joints was rescued with function intact; in the other patient both hips healed without loss of function.

The first of the 2 last-mentioned patients was a 9 year old boy who with the first symptoms of limping was immobilized in a long plaster case and treated at once with para-aminosalicylic acid and INH. At this time the roentgenogram disclosed ulceration of the femoral head and narrowing of the joint cleft on the left side. On the right side there were irregularities of the contour of the femoral head and osteolytic lesions in the acetabular walls. After some months of treatment the right hip joint was opened, the lesions

curetted, and the defect filled with bone chips. On the left side the severity of the lesions led to fixation of the joint by means of a nail, for arthrodesis. Two years after the first operation there was observed roentgenologically a solid iliofemoral synostosis. On the right side there was, at this time, a cicatrization of the lesions with complete mobility of the joint.

The second of the 2 patients was a 6 year old boy with a positive family history. The limp first occurred in the left lower extremity, which was immediately immobilized in a long plaster cast; treatment with streptomycin and para-aminosalicylic acid was at once initiated. Six months later this joint was ankylosed. The roentgenogram at this time disclosed, on the left side, a slight narrowing of the articular cleft and enlarged lymph nodes in the inguinoiliac region. There were osteitic lesions in the form of cavities extending widely in the roof of the acetabulum. On the right side there was a small erosion on the external margin of the femoral head and a voluminous osteolytic cervical shadow defect. Both limbs were now immobilized in a long plaster cast and treatment of energetic character, with streptomycin, para-aminosalicylic acid, INH given systemically and streptomycin given intra-articularly was instituted. Two months later the left joint was opened, the osteitic lesions were curetted, and the resultant defects were filled with spongeous bone fragments. Three months later a similar procedure was carried out on the left side. Some 2 months after the last operation cicatrization of the lesions was demonstrated roentgenologically without further evidence of progress of the disease. Clinically, complete mobilization of both joints was found to have been attained. The total duration of treatment was 13 months.

Thus, it is obvious that the antibiotic treatment can transform the evolution of tuberculosis of the hip joint, with rapid stabilization, a shortened period of immobilization, and avoidance of later growth troubles.

The author concludes that antibiotic therapy coupled with a surgical attack on the lesions brings a better prognosis in bilateral tuberculosis of the hip joint in the young patient.

—*John W. Brennan, M.D.*

Congenital Absence of the Fibula. T. Campbell Thompson, Lee Ramsay Straub, and William D. Arnold. *J. Bone Surg.*, 1957, 39-A: 1229.

Congenital absence of the fibula describes an anomaly characterized not only by absence of the fibula but also tibial bowing, deficiency in growth of the extremity, and deformities of the foot. The etiology of the condition is obscure. Most studies point to the defect as an acquired anomaly occurring as a result of an accidental injury to the embryo at about the sixth or seventh week. It is likely that some subtle insult is involved, possibly anoxia within the embryo.

The authors review 31 instances of congenital absence of the fibula occurring in 25 patients. They emphasize the constant pattern of the deformities in each patient, the presence of a tight deforming band replacing the absent fibula, and finally, the effect of early excision of this band. Most of the patients were seen first in infancy. No hereditary factors could be determined. The lower limb was short in every case, the femur frequently being involved in the total limb-length discrepancy. Talipes equinovalgus was consistently present; genu valgum and posterior displacement of the foot occurred less frequently. Bowing of the tibia was frequent. A pretibial dimple, present in 17 patients at the apex of the tibial bowing, usually occurred in the more severe deformities. Tarsal and metatarsal anomalies occurred in nearly every instance.

A tight band of fibrous or fibrocartilaginous tissue was present in 18 extremities in the posterolateral portion of the calf extending from the calcaneus to the upper portion of the tibia. This was separate from the tendo achillis, which was also apt to be tight in these patients, and was frequently palpable. Little attention has been directed to this band in the past. In 11 instances the band was dissected and removed. In each case it was found lying in the posterior and lateral area of the calf, lateral to the tendo achillis. The distal end was firmly attached to the posterolateral aspect of the calcaneus. Proximally the band was usually found attached to the lateral margin of the upper portion of the tibia. The band was taut, firm, and inelastic and in several patients it contained bits of cartilage or even bone. In nearly every patient the foot could not be brought out of the talipes equinus following division of the tendo achillis until the band had been divided as well. When the band was removed, it was always found in the location which the fibula would have occupied had it been present.

Among the 31 extremities, the band was present in 18. Dissection failed only twice to reveal a band. A study of the records of the 11 other extremities failed to indicate the presence or absence of a band. In each of the patients in whom the band was excised, the talipes equinus was corrected, the valgus deformity lessened, and the tibial bowing reduced. All the patients were subsequently able to walk with ease and enjoy full activities in an elevated shoe or simple elevated brace. Most of the operations were performed on children who were less than 2 years of age. The authors believe the favorable results are related to the early age at which the band was excised. Later in life many patients request amputation because of the degree of shortening of the limb, even though the bowing has been corrected. Syme's amputation is much better than the standard below-the-knee amputation and the procedure should be delayed until closure of the lower tibial epiphysis. —*Bernard C. Gerber, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Küntscher Method of Intramedullary Fixation. Gerhard B. G. Küntscher, *J. Bone Surg.*, 1958, 40-A: 17.

The author discusses the principles of intramedullary fixation of long bones and describes the advantages of the cloverleaf nail. He believes that the basic principle in this method is rigid immobilization of the fragments through flexible impingement of the nail in the bone. The nail must be of sufficient diameter to occupy the entire cross section of the medullary canal and must be strong enough to bear the body weight and muscle stresses. The author often accom-

plishes asymmetry of medullary canal width by extensive and wide reaming of the canal. He states that destruction of the endosteum, nutrient artery, and bone marrow are to be preferred rather than inadequate fixation. He cites one case in which the medullary canal was reamed from a diameter of 5 millimeters to sufficient diameter to accommodate a 12 millimeter nail.

The author states that intramedullary nailing can usually be done without opening the fracture site and recommends that even when osteotomy is performed there be no periosteal stripping at the osteotomy site. He states that another benefit of intramedullary nailing is the reduction of the incidence of fat embolism. He believes that in order to achieve this reduction, intramedullary nailing should be done 5 or 6 days after the fracture and that the nail should be driven into place slowly so that there will be opportunity and time for the intramedullary fat to drain off.

The article illustrates the use of the cloverleaf nail in the treatment of fresh fractures, pseudarthroses, and in the immobilization of osteotomies.

—Norman J. Rosenberg, M.D.

Reconstruction of the Thumb. STERLING BUNNELL. *Am. J. Surg.*, 1958, 95: 168.

GRIPPING POWER depends on the action of the ulnar nerve in flexing, by the intrinsic muscles, the proximal finger joints, and also the flexor pollicis brevis and adductor muscles in flexing the metacarpophalangeal joint of the thumb.

When a new thumb is reconstructed, there should be definite planning to give the individual position, stereognosis, and motion. It is very essential to get sensation, and if possible a flap of skin should be swung from the hand over the tactile part of the new digit.

Phalangization is deepening an interdigital cleft so that the metacarpals will act as phalanges.

Transferring digits from hands or feet has not been satisfactory.

Pollicization has given good end results providing that movement, stereognosis, and good positioning are secured. Pollicization on a neurovascular pedicle has also turned out quite satisfactorily. When the skin bridge is eliminated great versatility is given by placing the thumb in its optimum position. Since its blood and nerve supply are retained, its vitality is maintained and it can be placed in optimum position. The tendons may also be carried over. Three figures are included in the article to show the results that the author obtained. *—Richard J. Bennett, Jr., M.D.*

Treatment of Acute Infectious Arthritides of the Knee (Traitement des arthrites infectieuses aigues du genou). JEAN LORTHIOIR. *Sem. hôp. Paris, Ann. chir.*, 1957, 11: 1741.

TWO INSTANCES of acute knee infection treated by a method developed by the author are reported.

The first patient was a 9 year old girl who fell on her knee. Three days later extremely violent pains developed in the injured knee. The temperature went up but there was still no effusion in the joint itself and no portal of entry for an infective agent could be found. On the sixth day the effusion appeared and puncture produced a greenish pus containing the Staphylococcus aureus. Treatment was immediately instituted, consisting of continuous irrigation through the joint by means of irrigation needles, one inserted on the inside and the other on the outside of the joint. The irrigation fluid consisted of warm saline solution containing 1 pro mille novocain, 25,000 units of streptokinase, 400,000 units of penicillin, and 1 gm. of streptomycin per liter.

Eight days after the institution of treatment the temperature had dropped to normal and the joint was painless and dry. Irrigation was stopped—the streptokinase was not added to the perfusion fluid after the perfused solution had become perfectly clear—and a plaster ambulatory splint was applied. At the end of 15 days the plaster was removed and mobilization of the joint was begun. The joint function in this young patient returned rapidly.

The second patient was a 15 year old girl who had likewise suffered a fall on her knee. Again no portal of entry could be found and puncture produced a greenish pus containing Bacillus coli. Treatment identical to that used for the first case was instituted. The temperature returned to normal, but on the third day of treatment the patient pulled the irrigating needles out and the temperature rose again. Irrigation was reinstalled and maintained for a further 8 days, the limb remaining immobilized in the meantime. The irrigation was then stopped; however, the temperature, which seemed to be unrelated to the joint condition, persisted for some days. Fifteen days after the cessation of the irrigation, mobilization of the joint was begun, and 15 days later flexion reached an angle of 90 degrees.

The author emphasizes the fact that the treatment is easy of application, simple of actuation, and may avoid the necessity for an arthrotomy with all its undesirable consequences.

—John W. Brennan, M.D.

FRACTURES AND DISLOCATIONS

Compression of the Bone Ends as an Aid to Union in Fractures; a Report on 49 Ununited and 4 Recent Fractures. THOMAS KING. *J. Bone Surg.*, 1957, 39-A: 1238.

THE AUTHOR reports a series of 49 ununited fractures which were subsequently treated by compression of the bone ends by means of either Kirschner wires or Steinmann pins. The bone ends are countersunk and sharpened or pointed to bring as much cancellous bone as possible into contact. The pressure is exerted either by tightening the Kirschner wires together on a single frame or by applying compression by means of heavy rubber bands across the Steinmann pins. About 25 pounds of compression are maintained for 4 to 6 weeks. The lower end of the humerus and the upper half of the tibia are the most suitable locations for application of this method. This method should not be used on fractures of the radius and ulna as unequal shortening may result in subluxation of the distal radioulnar joint. The femoral shaft is not a very suitable bone for compression because there is not much cancellous bone to compress except in the lower end of the shaft.

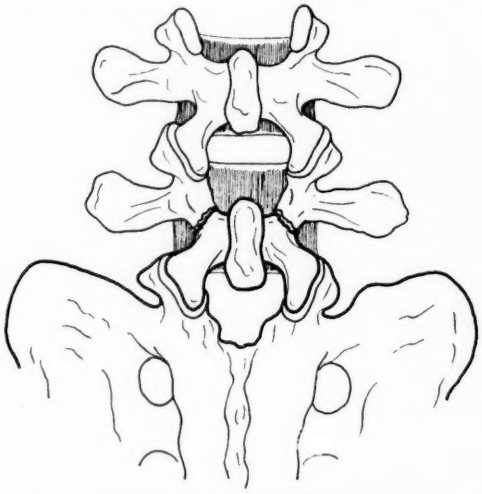

FIG. 1 (Monticelli, Maresca). Schematic drawing of the lumbosacral spine. Dotted line shows isthmic lysis.

Forty-nine ununited fractures were treated by this method; 41 were united. Twelve of the 13 fractures with sinuses before operation united. When the fracture united, the sinuses healed. In 4 recent fractures with gross displacement union took place.

—*Bernard C. Gerber, M.D.*

The Surgical Treatment of Spondylolisthesis; The Marino-Zuco Technique (Il trattamento chirurgico della spondilolistesi la tecnica di Marino-Zuco). GIORGIO MONTICELLI and ANTONIO MARESCA. *Ortop. traumat. app. motore*, 1957, 25: 857.

FOLLOWING A BRIEF REVIEW of the various techniques hitherto recommended for the surgical treatment of spondylolisthesis, including the posterior, anterior, and lateral approaches, and the transperitoneal, or the extraperitoneal approach, it is stressed that none of them achieve the object of operation, namely that of anchoring the vertebral body to the arc and consolidation of the bilateral breach. The latter persists in more than 30 per cent of the cases with persisting pain. Some years ago, Marino-Zuco devised a technique based on the anatomic aspects of the lesion, assuming that permanent results could be attained only by revitalization of the segments of the isthmic lysis, interapophysial arthrodesis, and insertion of grafts for the anatomic reconstruction of the parts. The various stages of his technique are presented graphically (Fig. 1).

The stages of the operation include: a curvilinear incision with its center over the loosened vertebra, marked on the skin by a metal guide; following incision of the skin and subcutaneous tissues, the aponeurotic plane is incised; and following exposure of the spine of the apophysis a thin strip of periosteum is removed together with the insertion of the paravertebral muscle from the lateral surface to the posterosuperior and posteroinferior surfaces, the muscles being kept properly retracted with self-retaining clamps. The arch of the slipped vertebra is then seized with a forceps and the mobility of the arch is ascertained. The spinous process of the involved vertebra is then resected. The last procedure facilitates removal of the portion of the arc that has been separated by lysis on both sides. The arc is then liberated from adhesions to the subjacent dura and the capsule of the superior and inferior intra-apophysial joint is opened for temporary removal of the arc (Fig. 2).

The lytic area corresponding to the isthmic portion of the vertebra is thus clearly exposed. Interposed fibrous tissue is removed and the terminal portion of the isthmus is freshened for reception of the graft by removal of cartilage from the upper surface of the involved vertebra and the lower surface of the vertebra above it; a homoplastic graft is obtained from the blood bank, consisting of a rib fragment 7 to 8 cm. in length, and divided longitudinally along the frontal surface to obtain two thin, flexible strips, which are placed in the previously prepared beds (Fig. 3), one on each side inserted between the superoinferior apophysial surface of the joint and covering the lytic focus, the inferoarticular surface of the subjacent vertebra or the sacrum. The arc is then replaced in situ in direct contact with the graft and secured proximally and distally with sutures of stainless steel (Fig. 4). Following reconstruction of the spinal apophyses, the muscles are replaced in the paravertebral groove and the skin is sutured. The patient remains in bed for 2 months, and is immobilized in a plaster cast for another 3 months; this cast is replaced by a removable cast worn for a similar period. Four cases are described in detail with roentgenograms.

The Marino-Zuco technique is indicated especially in cases of spondylolisthesis of the fifth lumbar vertebra with marked lordosis of the spine and advanced slipping of the vertebra. The operation permits, besides exploration of the roots, the freshening of osseous foci otherwise inaccessible and removal of cartilage from

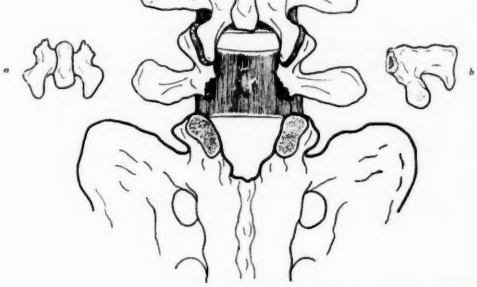

FIG. 2. After temporary removal of the arch of the fifth lumbar vertebra separated from the body of the vertebra by the isthmic fissure and surgical treatment of the lytic foci on both sides and the articular surfaces. a, Posterior aspect of removed arch; b, lateral view of the arch following operation on the lytic foci of the inferior articular surfaces.

the apophysial joint surface of the sacrum. In less advanced forms of spondylolisthesis, with exclusive lumbosacral pain and in cases of spondylolisthesis without slipping of the vertebra, removal of the vertebral arch is not always indispensable. This technique is not indicated in spondylolisthesis associated with marked deformity of the arc, when it is better to remove the semiarcs and interposed fibrous tissue. All of the cases described showed consolidation of the lytic focus, block of the freshened articular surface, and perfect fixation of the graft in its new bed. Roentgenograms confirmed the absence of abnormal movement and solid fusion of the vertebral body to the arc. Pain and sensations of weight or rigidity of the spine ceased.

—Edith Schanche Moore

Central Fractures of the Acetabulum. ROBERT A. KNIGHT and HUGH SMITH. *J. Bone Surg.*, 1958, 40-A: 1.

THE AUTHORS have carefully studied a number of central fractures of the acetabulum and have presented their experience with open reduction in a number of these cases. They have attempted to categorize the fractures by likening the acetabular shadow on the roentgenogram to the face of a clock and describing the fractures as they correspond to imaginary hands on the clock. With this classification the fractures are divided into two major types: horizontal and vertical. The horizontal fracture is best approached through an anterior incision but, in the authors' experience, the vertical type of fracture is best reduced through a posterolateral incision. The importance of stereoscopic roentgenograms is emphasized. The principal aim of open reduction is to restore the superior acetabular weight-bearing surface and as nearly as possible to restore the anatomy of the acetabulum.

The authors describe in detail many helpful methods which they have used to reduce the fracture and illustrate the use of several different types of pins as well as screws, plates of different types, and even staples when indicated.

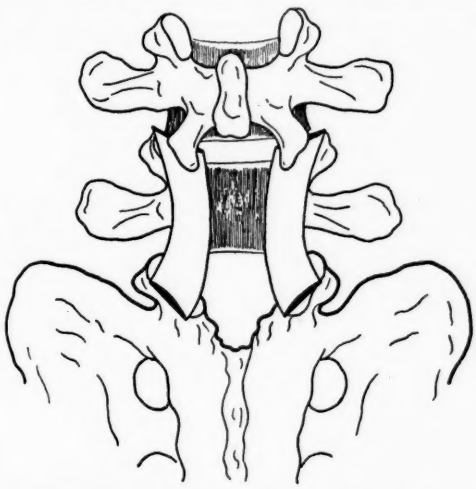

FIG. 3. The two split homoplastic rib grafts on previously prepared bed.

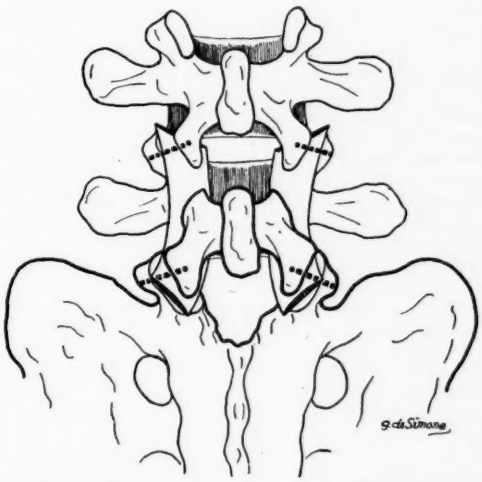

FIG. 4. Replacement of the arch and fixation with a steel suture proximally and distally.

The appearance of the postoperative roentgenograms in a number of cases seemed to justify their enthusiasm though the follow-up period in most cases was short. The article affords an excellent positive approach to these difficult fractures and warrants careful study. *—Norman J. Rosenberg, M.D.*

Femoral Shaft Fractures in Children; Late Results (Der Femurschaftbruch beim Kind; Spaetergebnisse). K. H. SCHENK. *Langenbeck's Arch. u. Deut. Zschr. Chir.*, 1957, 286: 144.

THE FUNCTIONAL RESULTS of the treatment of fractures in children are, in general, very good. These results are often further improved as the child grows. A survey of the literature reveals a surprising variation in the methods of treating fractures of the femoral shaft in children. The variety of methods of treatment proposed expresses the limited possibilities of reduction and immobilization of femoral shaft fractures in children. In the 10 years from 1943 to 1952 inclusive, 152 children with fractures of the femoral shaft were treated. This figure includes children up to 15 years of age.

The cases were examined to determine the course of the fracture healing, the methods of treatment employed, and the late results. All charts and x-rays were studied to determine the type and severity of the original fracture, and to determine the x-ray findings and functional result at the time the patient was discharged. A questionnaire was sent to the patients. One hundred twenty-two of the 152 patients replied. They were questioned as to the existence of residual pain, the ability to walk, the motion of the knee and hip joint, length differences in the extremities, and recognizable deformities. They were also questioned about the necessity for further medical care. Seventy-five of the patients were available for

follow-up study and x-ray evaluation of the late results.

Forty per cent of the fractures were the result of traffic accidents, 29 per cent were due to the misfortunes of daily life, and 28 per cent were due to play and sport. There were 58 oblique, 50 spiral, 39 transverse, and 5 comminuted fractures in this group. Marked displacement of the fracture fragments was present in 65 cases, mild displacement in 55, and almost no displacement in 29 cases.

The difference in nourishment of the children who were treated during the war years and those who were treated in the post-war period had no recognizable influence on the healing of the fracture. The roentgenographic appearance of the fracture and the function of the extremity at the time the patient was discharged varied inversely with the degree of displacement of the fracture fragments at the time of admission; that is, those patients who had almost no displacement had the highest percentage of good and satisfactory results and the smallest percentage of fair results, while those with the greatest degree of displacement had a higher proportion of fair results and a smaller proportion of good and satisfactory results.

In children 6 years of age and younger, the femoral shaft fractures were treated by means of vertical traction applied to the extremity. The traction apparatus was attached to the extremity by means of adhesive plaster. Reapplication of the adhesive plaster was necessary only eight times. Skin infections were not a problem in these patients. Skin irritation was mild in 12 patients, moderate in 3, and severe in 2 patients. In the latter 2 patients, adhesive traction was abandoned and traction through a Kirschner wire was substituted. In older children, traction was applied to the extremity through a wire. Most often, the wire was placed through the tibial tuberosity but supracondylar wires were also used. Infections along the tract of the wire were mild in 6, moderate in 2, and severe in 2. Operative treatment was necessary in only 5 instances. In these cases the reduction was maintained by encircling wires. Intramedullary nailing was not used up to 1953. Intramedullary nailing has been used during the past 3 years in difficult cases. Because of the excellent results obtained by conservative means, even when the fractures are not exactly in anatomic alignment, open operation and particularly intramedullary nailing should be reserved for very special cases.

One hundred twenty-two patients replied to the questionnaire. Sixteen of the patients rated their result as very good, 80 as good, 19 as satisfactory, 6 as fair, and 1 as poor. The one poor result was a patient who had an infection along a wire tract which resulted in a stiff knee. In general, there was improvement in the function of the extremity between the time of discharge and the time that the patient answered the questionnaire. Only 4 patients had ever consulted a doctor again about the fractured femur.

Seventy-five patients were available for follow-up examination and follow-up x-rays. A surprisingly high percentage of patients had restitutio ad integrum. For example, a 5 year old child who had a complete transverse fracture of the midshaft of the femur showed good callus formation but over-riding, rotation, and angulation at the fracture site at the time of discharge. Seven years later the roentgenogram revealed an essentially normal femur. The shortening had disappeared. Poor position of the fracture fragments did not necessarily lead to a disturbance in function of the extremity. Lengthening or shortening of the injured extremity, up to 2 cm., did not cause any difficulty. Those patients who had a combination of faulty position and axial rotation equalized the defect less often than those patients who had merely simple displacement or some bowing at the fracture site.

In 3 patients there was persistent shortening of up to 2.5 centimeters. Four patients who had originally healed with shortening showed improvement in the length of the bone of up to 2 centimeters. Thirty patients, almost one-half of those available for follow-up, showed an increase in the length of the affected side. Six of these patients had an increase in length of 1 to 3 centimeters, and 24 patients had an increase in length of 0.5 to one centimeter. In only two instances was an increased diameter of the fractured bone noticed.

Epiphysial injuries were not considered in this series. —*Robert D. Larsen, M.D.*

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Effects of Linolenic and Stearic Acids on Cholesterol-Induced Lipoid Deposition in Human Aortic Cells in Tissue-Culture. DAVID RUTSTEIN, ESTELLE FASOLINO INGENITO, and JOHN M. CRAIG. *Lancet*, Lond., 1958, 1: 545.

STERILE AORTIC SEGMENTS removed from patients with coarctation of the aorta furnish standardized tissue cultures by a technique previously developed in the authors' laboratory. Cholesterol, ethanol, beta lipoprotein, and fatty acids are added singly and in combination to the tissue cultures. An intracellular deposition of lipoid usually occurs in 4 or 5 days. It reaches its maximum on the fifth to eighth day after the experiment has begun and can be confirmed by staining with Sudan IV. Lipoid deposition appears when cholesterol has been added in a concentration of 1 mgm. per 100 c.c. of medium and is more clearly seen at a concentration of 2 mgm. This deposition is intracellular and is always associated with enlargement of the entire cell including the nucleus. When the medium containing added cholesterol is replaced at 8 days with normal medium the cells gradually regain their normal appearance in 5 additional days, although some deposited lipoid remains. If the cultures are fed again with medium containing the same concentration of cholesterol all the cells show increased deposition of lipoid and die during the next 2 days. When increasing amounts of linolenic acid are added simultaneously with the cholesterol, decreasing amounts of lipoid are deposited in the cells. When linolenic acid is added in addition to the beta lipoprotein cholesterol, intracellular deposition of lipoid is almost completely inhibited. In contrast when a similar concentration of stearic acid has been added to beta lipoprotein cholesterol, much more lipoid is deposited in the cells. In summary, in tissue cultures of human aortic cells deposition of lipoid can be induced by cholesterol, is reversible, can be inhibited by an unsaturated fatty acid (linolenic acid), and can be potentiated by the corresponding saturated fatty acid (stearic acid). —*Allan D. Callow, M.D.*

Aneurysms of the Aorta; a Study of 65 Cases. JOHN L. BOURNE, JR. and MAX R. GASPAR. *West. J. Surg.*, 1958, 66: 9.

THIS STUDY covers a 10 year period at the Los Angeles County Harbor General Hospital during which 65 patients with aneurysm of the aorta were seen. The thoracic aorta was involved in 21 patients, and the abdominal aorta was the site of the aneurysm in 44. The majority of these aneurysms were arteriosclerotic. Men exceeded women by almost two to one in the series. Approximately two-thirds of the patients were between the ages of 60 and 80.

Vague abdominal and back pains in patients over the age of 50 should make one suspect an aneurysm of the abdominal aorta, and in most cases the presence of such an aneurysm can be confirmed by abdominal examination. There were 11 deaths due to rupture of the aneurysm, and it is of interest that in 3 of these the aneurysm was 5 centimeters or less in diameter. All of the patients who died of rupture of the aneurysm lived for at least 10 hours after the onset of symptoms of rupture, and some lived several days. There would seem to be adequate opportunity, therefore, for operative treatment in most patients with ruptured aneurysms. —*George R. Holswade, M.D.*

Embolism to the Bifurcation of the Aorta. CHILTON CRANE. *N. England J. M.*, 1958, 258: 359.

FOURTEEN PATIENTS with aortic-bifurcation embolism were operated upon at the Peter Bent Brigham Hospital during the last 10 years. In 12 patients the operation was performed within 6 or less hours after the onset of symptoms. Four patients died, and low thigh amputation was necessary in 2 other patients. The embolism occurred in 2 patients after myocardial infarction. In 12 patients there was rheumatic heart disease with myocardial infarction, and atrial fibrillation was present in all but one of these. Eight of the surviving 10 patients have undergone mitral valve surgery, 4 before and 4 after the embolectomy. Consideration should be given to emergency mitral valvuloplasty preceding embolectomy in the patient with severe mitral stenosis and saddle embolism when hypotension and pulmonary edema do not respond to the usual therapeutic measures.

Several of these patients with mitral stenosis had warning emboli a few days before the saddle embolus, and many of them had emboli to other sites at the time of the aortic embolism. Thus, mitral valvuloplasty should be done promptly after warning emboli, and careful watch should be kept for other emboli, concurrent or following the aortic emboli.

A transabdominal approach under continuous spinal anesthesia is recommended in all except the most desperately ill patients for whom embolectomy from below the inguinal ligaments under local anesthesia should be considered. Early embolectomy should be considered in every case.

—*George R. Holswade, M.D.*

Angiographic Findings in the Cervical Portion of the Internal Carotid Artery (Befunde am Halsteil der A. carotis interna im Angiogramm). K. DECKER. *Fortsch. Roentgenstrahl.*, 1957, 87: 693.

THE SIGNIFICANCE of extracranial vascular segments in the etiology of cerebral circulatory disturbances is explained, with particular reference to the cervical portions of the internal carotid artery. Certain points of technique in attempting to diagnose changes in this region angiographically are stressed: For plain demonstration of the tip of the needle, which is imperative, lateral exposures are recommended, although in very short necks or attempted introduction of the needle into the artery at the level of the clavicle, the injection can be made only in anteroposterior exposures. Examination should not follow a rapid, lateral serial angio-

gram but following injection a Bucky-frame should be placed as close as possible at the shoulder level in order to expose the largest possible portion of the cervical section of the internal carotid together with the intracranial vessels. Such a test exposure is also recommended if the typical blanching in the region supplied by the supraorbital artery fails to follow a test injection of Ringer's solution. A similar exposure may be taken following a rapid serial angiogram. A ventrodorsal exposure affords a good view of the bifurcation of the common carotid artery if abundant vessels obscure the initial section of the common carotid in the lateral exposure. If vascular changes are suspected in the petrosal canal, the head should be turned 45 degrees toward the side of the noninjected carotid, thus exposing the entire carotid canal in the petrosal region and along the sphenoid body. Such a procedure will also occasionally reveal a collateral circulation above the right orbit.

Among the dangers of excessive vascular injections in patients who have lesions in the cervical region may be mentioned injection into the wall of a vessel with a constricted lumen as well as para-arterial injections, which may lead to serious circulatory disturbances. Angiography without a general anesthetic, or even painful puncture of a vessel, may cause a fall in blood pressure with possible transitory focal reactions. If during the course of injection, the patient becomes drowsy, his hand pressure diminishes, or vision on the injected side is affected, the procedure should be interrupted. Continuous observation of the patient and his blood pressure are mandatory. Artefacts and normal variants in the course of the internal carotid artery with age must be kept in mind. In arteries with very narrow lumina so little of the contrast medium gets into the intracranial vessels that a false impression is obtained. Stratification phenomena may be difficult to differentiate from active contraction of the vessel wall. Some loop formations of the carotid artery have no pathological significance. Artefacts may be due to the injection, and vascular reactions with annular contractions of the vessel wall at the level of the tip of the needle may follow a proper injection of contrast media. Of injuries to the vessel wall, one has to consider (a) hemorrhages beneath the intima, particularly in the posterior wall of the vessel; (b) penetration of the vessel wall by saline or Ringer's solution injected between contrast injections; and (c) injections of small amounts of contrast medium beneath the vascular intima that may interfere with circulation in the carotid artery. Serious damage may occur even in the presence of slight clinical symptoms. In the presence of pathologically constricted vascular lumina, injury may lead to neurological disturbances. Most circulatory disturbances in given portions of the carotid artery retrogress promptly without serious sequelae, and only a few persist or become permanent.

The angiographic changes in arteriosclerosis of the internal carotid artery are described in detail. Very rarely, vascular contraction in intracranial hemorrhage proceeds from the carotid syphon to the cervical region. In constrictions of the lumen due to prior injection of the vessel wall, the constriction will extend for several centimeters but presents no circumscribed indentation. The carotid may be constricted, though not markedly displaced, in tumors of the nasopharynx, and in rare cases the carotid may be hypoplastic. Survived embolism or constriction due to vascular obstruction might have to be considered but would be difficult to recognize. Combined vascular changes in the cervical and syphon portions of the vessel also have to be considered, such as arteriosclerosis or Buerger's disease, as well as syphilitic endangiitis. Any classification of the changes in the cervical portion of the internal carotid artery would be difficult, since both functional and organic vascular changes may be involved. There may be injuries to the vessel wall inflicted by the injection per se or by the contrast medium. Thus angiography of the cervical internal carotid artery poses many problems. When the serial angiogram reveals peculiarities in the intracranial circulation, a special angiogram of the cervical portion of the internal carotid artery is indicated. Before interpreting a changed filling as a spasm of intracranial vessels, the possible existence of a transitory circulatory defect due to changes in the vessel wall in the cervical portion or to artificial blocking of the circulation must be considered.

—Edith Schanche Moore

Arteriography in Brachiocephalic Arteritis (Pulseless Disease or the Takayashu Syndrome). INGMAR WICKBOM. *Acta radiol.*, Stockh., 1957, 48: 321.

PULSELESS DISEASE was first described by a Japanese ophthalmologist, Takayashu, in 1908. In this syndrome the pulses are absent in the brachiocephalic arteries because of an obliterative endarteritis of these vessels. Although the obliteration is usually confined to the first part of the brachial or common carotid arteries, in advanced cases the changes may also be seen in the thoracic and abdominal aorta. Symptoms are associated with ischemia in the region supplied by the affected arteries. Thus, claudication in the arms and jaw muscles, fainting, visual disturbances, transitory aphasia, and hemiplegia are all part of the clinical picture. Young or middle aged women are most commonly affected and the condition is a progressive one. The etiology is not known, but there are some indications that the process is of a rheumatic character.

Arteriography offers a means of establishing the location, extent, type, and degree of arterial changes in this syndrome. Two cases of Takayashu's syndrome are reported in which a catheter was inserted through the femoral artery and injection of the dye was made with the tip of the catheter near the origin of the subclavian artery. Best results are obtained when the tip of the catheter lies in the aorta near the point of origin of the diseased vessel. A trial injection of a small amount of contrast material is suggested first to check the position of the catheter. Then 15 to 20 mm. of 40 per cent urokon is used for the definitive examination. The changes noted in the vessels differ from those due to arteriosclerosis in that the narrowing is regular and the walls are smooth. Constriction due to arteriosclerosis is not symmetrical or regular.

In one patient treated with cortisone there was symptomatic improvement. Angiography done 4 years after the initial examination showed less marked constriction in a popliteal artery.

—George R. Holswade, M.D.

Reconstructive Surgery of Large Arteries (Fortschritte und Probleme der Wiederherstellungschirurgie grosser Arterien). G. HEBERER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1957, 287: 276.

RECONSTRUCTION OF THE AORTA above the renal vessels calls for supplementary measures such as controlled hypotension, hypothermia, temporary shunts, and occasionally a complete extracorporeal by-pass. Venous autografts have been used. Presently, arterial homografts are being used extensively, preferably those preserved in a freeze-dried state. The late results of the homografts are unknown at the present time.

Experimentally the author considers teflon and nylon as the best alloplastic materials for aortic replacement. He observed very satisfactory intima and endothial formation 3 to 4 weeks following surgery. Alloplastic materials have not succeeded in arteries of medium diameter.

Discussing various surgical indications and procedures, the author considers reconstruction of traumatically injured arteries of the extremities as the only good therapeutic procedure, in contrast to the formerly used ligature. The treatment plan for injured peripheral arteries is as follows:

1. Preoperative.
   1. Temporary hemostasis.
   2. Treatment of shock.
   3. Avoidance of unnecessary delay.
2. Operation.
   1. Primary suture if possible.
   2. Replacement with either venous autograft or arterial homograft, if needed.
   3. Ligature permitted only in smaller vessels with good collateral circulation.
3. Postoperative.
   1. Always needed a, positioning of the extremity about 10 cm. below the heart level; no heat or cold to the extremity.
      b, antibiotics.
   2. Rarely needed a, anticoagulant therapy.
      b, sympathetic block.
      c, Vasodilatory measures.

This plan especially concerns the popliteal, common iliac, femoral (above the profunda), anonyma, common carotid, internal carotid, and brachial (above the profunda) arteries.

Traumatic arteriovenous fistulas in the form of expanding pulsating hematomas or "false aneurysms" should be treated by excision and repair immediately. The traumatic arteriovenous fistula per se does not require emergency treatment. A few months' delay may be beneficial for the development of the collateral circulation. Here, too, if at all possible, reconstructive procedures should always be performed instead of excision and ligature.

The aortic aneurysms are amenable to the well known reconstructive procedures—homografts, synthetic replacements for fusiform lesions, and excision and suture for sacciform lesions.

The proximally located dissecting aneurysms should be repaired, according to De Bakey, by transection of the vessel, complete obliteration of the false lumen distally, and partial obliteration proximally.

The coarctation is amenable to resection and end-to-end anastomosis in 90 per cent of the cases, grafting procedures rarely being indicated.

The author believes that thrombendarterectomy for occlusive lesions of medium-sized vessels is highly unsatisfactory as to long-term results, 60 per cent being successful. Grafting procedures with resection or when used as by-pass procedures are the procedures of choice; there was 88 per cent patency after 6 months. Arterial homografts or venous autografts are preferable. —*Gunars Medins, M.D.*

Arterial Replacement with Minimal Interruption of Blood Flow. D. J. TIBBS and W. G. LESLIE. *Lancet*, Lond., 1958, 1: 292.

THE AUTHORS describe an instrument which holds the open ends of pairs of arteries one against another in such a way that blood may flow through the vessels while the ends are anastomosed. As they are pinched together the cut edges are everted by the insertion of a double cone of frozen saline solution. Pairs of these instruments may be used to hold arterial grafts or prostheses of cloth to bridge defects in arteries. The interested reader is referred to the original article to examine the drawings.—*Leonard D. Rosenman, M.D.*

Deep-Frozen Arterial Homografts for Repair of Traumatized Vessels (Tiefgekuehlte homoioplastische Arterientransplantate bei frischen Verletzungen). J. BÖHLER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1957, 287: 323.

THE INJURED ARTERIES in question were mostly the large vessels of the extremities, especially the popliteal artery. Primary end-to-end suture is rarely possible and then only in cases of sharp clean division. The vessels are mostly injured by the combination of blunt and sharp trauma, and present tears which are not suitable for end-to-end suture. It is well known that the arteriosclerotic vessels of elderly people do not hold the inserted sutures when the least tension is present.

The author uses deep-frozen homografts kept in a carbon dioxide snow and methylalcohol mixture at −60 degrees C. He sets the following dicta for successful grafting procedure:

1. Surgery within 8 hours after the accident.
2. Preoperative arteriograms for exact localization.
3. Adequate skin incision.
4. Adequate resection of the traumatized arterial wall into healthy tissues.
5. The use of atraumatic arterial clamps. Tourniquets to be avoided during surgery.
6. Opening of the proximal clamp to wash out the clots before completion of the anastomosis.
7. Injection of heparin into the proximal and distal arterial stumps during the procedure (postoperatively, anticoagulant medication should be avoided to prevent hematoma, infection, and thrombosis).
8. Careful and atraumatic suturing technique.
9. Avoidance of dead space around the anastomosis.
10. Careful asepsis and routine antibiotic medication after operation.

The author reports 5 cases of arterial replacement with deep-frozen homografts after trauma to the extremities. —*Gunars Medins, M.D.*

The Significance of Early Filling of a Cerebral Vein in a Series of 528 Serial Carotid Angiograms (Signification de l'opacification précoce d'une veine cérébrale d'après 528 sérioangiographies carotidiennes). J. BAUMGARTNER and E. WORINGER. *Neurochirurgie*, Par., 1957, 3: 180.

THE AUTHORS report on a series of studies of rapid cerebral angiography using the Schönander apparatus. The authors state that in reviewing their carotid angiograms of patients suffering from malignant cerebral tumors, they frequently found early filling of a vein which either directly drained the tumor or was located in the region of the tumor. They studied, therefore, 22 normal serial cerebral angiograms and a series of 506 serial cerebral angiograms in patients with tumors. In none of the normal angiograms did precocious filling of a cerebral vein occur, either of the deep or superficial systems. Precocious filling of a cerebral vein was found in almost all of the angiograms of patients with glioblastomas, neurospongiomas, oligodendrogliomas, and astrocytomas. In the case of the gliomas, the opacification always occurred in the region occupied by the tumor. It was observed only in a few cases of meningioma and metastases and in these, without exception, occurred in the area draining from the tumor. It was also observed to occur in some of the nontumorous types of cerebral disease, such as epilepsy and cortical scarring. With rare exception, this sign of early venous filling has been accompanied by other signs of a hemispheric lesion as shown by symptoms, clinical findings, electroencephalography, or pneumoencephalography. However, a cerebral lesion does not necessarily show itself by the presence of this sign of early venous filling. —*Nicholas Wetzel, M.D.*

Reappraisal of the Sclerotherapy of Varicose Veins. EGMONT J. ORBACH. *Angiology*, 1957, 8: 520.

ALTHOUGH it is generally agreed that radical extirpation of varicose veins is the best guarantee against recurrence sclerotherapy can be very useful. The author states his indications for sclerotherapy as generally including: (1) all closed circuit superficial varicosities; (2) varicose veins producing pathologic changes in the skin in patients who refuse or cannot undergo surgery; and (3) sclerotherapy of varicose veins during pregnancy with the exception of the last trimester.

He lists six contraindications to sclerotherapy: (1) huge varicosities, (2) local or general allergic reactions and acute infections, (3) underlying arterial disease, (4) varicosities caused by pelvic tumors, (5) uncontrolled systemic disease, and (6) psychopathic or otherwise uncooperative patients. Complications include extension of the thrombus into the deep veins, anaphylactoid and allergic reactions, postinjection pain due to excessive thrombus formation, and slough ulcers.

The author recommends the use of .5 c.c. of 3 per cent sotradecol solution mixed with .5 c.c. of air to form foam and an additional .25 c.c. of air introduced in addition to the foam to act as an air block. He advocates minute doses, avoidance of excessive thrombi and their surgical excision if such develop, continuous compression of the treated veins for a period of approximately 3 days in order to obtain vein obliteration by intima approximation and not by thrombus organization and capillary formation within the thrombus. He believes that within the framework of proper indications and proper technique sclerotherapy of varicose veins has stood the test of time.

—*Allan D. Callow, M.D.*

Thromboangiitis Obliterans; a 30 Year Study. FRANK V. THEIS. *J. Am. Geriat. Soc.*, 1958, 6: 106.

ONE HUNDRED THIRTY-NINE PATIENTS with thromboangiitis obliterans have been observed and followed up during the 30 years preceding this report. A concept of the nature of the disease has been formulated which led to improved therapy. In the past 16 years no patient has had a major amputation.

The author believes that thromboangiitis obliterans is a manifestation of juvenile atherosclerosis. He has observed extensive atherosclerosis in large vessels as well as visceral occlusive atherosclerosis in many of his patients with thromboangiitis obliterans. Three patients had aortic occlusions, which were noted at autopsy. It is his belief that the thromboangiitic lesions in some manner precede atheromas, and that the atherosclerosis is not, as other observers have proposed, merely an associated disorder with unrelated etiology.

Treatment should include serious attention to prevention and amelioration of minor infections, attempts to improve collateral circulation, and efforts to correct metabolic disturbances. The latter include the use of hypertonic saline, sodium citrate, sodium iodide thiosulfate, and anticoagulants to reduce the viscosity and coagulability of the blood. Measures to correct obesity, hypercholesterolemia, and hypothyroidism may have value. —*Leonard D. Roseman, M.D.*

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Emergency Medical Care in the Mountains (Aerztliche Nothilfe im Gebirge). G. NEUREUTHER. *Muench. med. Wschr.*, 1958, 100: 65, 110.

THIS ARTICLE is based on the 12 year experience of the author as physician to the Alpine Emergency Service of the Bavarian Red Cross. From 1945 to 1957, 59,452 people required first aid; 19,574 were injured severely enough to require transportation to hospitals and 741 died. Throughout this period, a steady increase in accidents has been observed. The increase can be related to the increased popularity of mountain sports, the easier access to the mountains which modern transportation affords, and, most important, to the lack of caution and care by individuals engaging in these sports. The greatest percentage of accidents involve people who have no experience, lack proper equipment, and are poorly trained for mountain activities. Proper physical condition is mandatory. It has been shown that an individual who has undergone a period of physical training has double the number of capillaries and 3.5 times the vascular anastomoses in his skeletal musculature that an unconditioned subject has. In the latter the cardiac output (stroke volume times cardiac rate) increases by increase of the cardiac rate, whereas in a physically trained individual the stroke volume increases because of increased "cardiac tone." Acclimatization to high altitudes is also important. One day of acclimatization should be allowed for heights of 3,000 meters or less. About a week should be allowed for heights of 3,000 to 5,000 meters. By adhering to several basic principles of mountain climbing, participants in this activity can prevent a majority of the accidents which occur.

The treatment of shock should be the first concern of those administering first aid to individuals who have sustained injuries in the mountains. Cold, fear, and pain usually aggravate the situation. The preservation of body heat and warming can be effected by the rescue party in the following manner: the patient in shock is placed between the legs of one of the members of the rescue party who allows the patient to lean back on his chest. A second rescuer can then position himself between the patient's legs and lean backwards, thus placing the person in shock between two warm individuals. A considerable psychic benefit is thereby also effected. Placing the lower extremities above the level of the head should be done when a warm environment is present. Warm sweetened drinks, such as tea or coffee, are also beneficial. Heated stones or hot water bottles and warm clothing should also be used. Alcoholic beverages are not indicated until the patient is placed in a warmed environment. Hypovolemia may be treated with intravenous infusions carried in plastic bags. Pressor agents and analeptics are of little value. Hypoxia should be treated by the administration of oxygen. The treatment of pain will be given. Finally, it must be remembered that the most important thing to avoid is immediate transfer of the patient from the locale of the injury since this undertaking can produce death. Treating the patient where he lies is far better than risking the added insult of a difficult journey.

Generalized hypothermia can occur readily at high altitudes and is promoted by high heat-conducting substance around the patient. Water conducts heat twenty-seven times better than air. Windy environment also promotes a greater loss of heat. Snow on the other hand conducts heat poorly. The drop in body temperature occurs from the center of the body (chest, abdominal viscera, and brain) to the more superficial portions (skin, fat, and musculature). At a temperature of 33 degrees C, the "shivering" reaction may proceed to tonic and clonic contractions. At 31 degrees C, some violence sets in. At 29 degrees C arrhythmias occur, and cardiac insufficiency usually occurs at 28 degrees C. At 22 degrees C death occurs. Therapy consists of rapid warming, preferably by placing the patient in a warm bath which can be started at 36 degrees C and then raised to 40 degrees C. The forearms and legs should be kept out of the water and wrapped with wet cold towels (see the discussion of localized hypothermia). Massage is valueless and may lead to hematomas. Infusions of glucose solutions at body temperature are helpful. Medications, both intravenous and subcutaneous, are dangerous because of irregular absorption and distribution. They have no place in the treatment of generalized hypothermia. Oxygen administration may be beneficial.

Localized hypothermia or frostbite must be treated differently. The damage which results is due to hypoxia. The latter occurs when the peripheral tissues are restored to normal temperatures while the deeper portions are still hypothermic. The vessels therefore are in spasm and the metabolic demand of the peripheral tissues cannot be met. The hypoxemia further aggravates the stasis and thrombotic changes which have occurred. Gradual warming of the frost-bitten area is therefore indicated. The generalized hypothermia should be first treated while the peripheral parts are kept cool. A temperature of +6 degrees C is ideal, but temperatures above this are harmful. After 2 to 3 hours the core of the body is usually warmed enough so that the peripheral areas can be warmed. Active movements of the frozen parts should be encouraged in order to increase the blood flow and warmth to the area. Crusts of ice in the distal parts of the body should be gently wiped off while immersed in water. Medication also plays a minor role in frostbite. Vasodilators may be employed. Thirty to 50 cubic centimeters of warm alcohol per os can be used. The immediate transportation of the patient should be to a warm enclosure, not necessarily to a hospital.

The problems encountered after an avalanche are combinations of trauma, generalized hypothermia, and suffocation. The cause of death in these cases is

variable. Occasionally death ensues after 5 minutes and sometimes a rescue can be effected after 72 hours. Vigorous resuscitative measures are often required.

Sunburn occurs readily at higher altitudes and is treated in the same manner as any sunburn. Snow blindness is a real danger. The loss of the patient's sunglasses is usually the cause. An adequate substitute may be fashioned from a piece of paper with a small hole in it. Anoxia may produce the classic signs and symptoms of "altitude sickness."

The nature of the activities engaged in in the mountains (skiing and mountain climbing) is such that the lower extremities are most commonly injured. Fractures present the greatest and most frequently encountered problem. It has been found that the immediate application of a traction splint is the most effective means of controlling pain, preventing complications, and allowing for easy transportation. As a rule, when transporting the injured patient down the mountain the fractured extremity should not be in a dependent position.

The differential diagnosis between dislocation and fracture is difficult and it is best to treat all suspected patients with traction splints. Removing clothing to examine the patient is inadvisable in cold weather.

Injuries of the spinal column are best managed by placing the patient in such a position that the spinal cord is free from compression, i.e., the patient's knees should be flexed and some support should be placed under his sacrum. By avoiding lordosis and kyphosis, the spinal column is kept straight.

Shoulder dislocations are best treated immediately because of the pain and consequent muscle spasm which occurs. —*J. C. Rosenberg, M.D.*

Anuria as a Complication of Surgical Diseases (Anurie als Komplikation bei chirurgischen Erkrankungen). E. Letterer. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1957, 287: 549.

Anuria as a surgical complication may be divided into two groups. In the first the surgical procedure is the causative factor, while in the second the disease present is the cause of the development of the anuria.

A relative decrease of glomerular filtrate in case of complete resorption in the loop of Henle may cause, on plain quantitative grounds, a clinically complete anuria. In addition to this primary glomerular anuria, a tubular type is recognized. The nephron is a synergistic complex; a possible mechanism eliciting this anuria is a tubular depression of the glomerulus, the primary site of urine production. Neurogenic and humoral factors come into play. The structural basis for this supposition are the Goormaght's cells, the paravascular cells, and the Macula densa.

Primary glomerular anuria is caused by decreased formation of glomerular filtrate. This type of anuria rarely leaves any morphological changes in the kidneys. A somewhat similar picture is presented by secondary fat embolism which causes complete blockage of the glomeruli. Anuria as sequence of fat embolism is rare as it is usually preceded by lethal cerebral embolism. Anuria associated with shock is also primarily glomerular in nature, but at the same time it is extrarenal. The basic single cause was formerly thought to be a blood pressure drop below 30 mm. of Hg. With such pressures, filtration ceases. Oliguria may also be due to blood volume and blood distribution changes. Other mechanisms in addition are responsible for anuria in shock. The decreased glomerular blood flow leads to "tubulorhexis" with disappearance of the basal membrane. Nervous-reflex constriction mechanisms seem to be involved similarly as in reflex anurias which are equally glomerular in nature.

In case of nephrohydrosis the renal tubules are filled with materials such as crystallized sulfonamides or hemoglobin and myoglobin products with albumin casts. The cause of such anuria is intratubular and not epitubular.

One type of severe tubular nephrosis with anuria was described by the author as "electrolytic anuria." Such nephroses occur after sulfonamide medication, transfusions of either mismatched or compatible blood, hemolysis, crush injuries, high frequency and other burns, as well as after surgical procedures with extensive tissue damage. The morphological picture in such kidneys is always the same—the glomerulus shows essentially no changes, but in many cases the transmission of intact erythrocytes is observed. Their lysis is followed by disappearance of iron-containing components which leave casts of porphyrinlike pigments. In hemolysis, mismatched transfusion cases, and crush syndrome, already dissolved substances are excreted by the glomerulus and pigmented casts are formed in the tubular lumina. The epithelial lining is destroyed and a characteristic "laminar nephrosis" develops. The glomerular filtrate is then resorbed into the interstitium of the kidney which leads to inflammation and swelling of the whole kidney.

In the hepatorenal syndrome, similarly, no kidney changes are found. This syndrome is characterized by liver disease and a kidney derangement causing nitrogen retention, oliguria, and anuria. It is known to occur as a complication of operations on the excretory biliary system. A quite similar situation may be reproduced experimentally by simultaneous clamping of the hepatic and renal arteries.

In acute pyloric stenosis with sudden and marked chloride loss necrosis of the tubular epithelium with deposition of calcium casts may be observed. The lack of calcium ionization underlies this condition. It is of interest that no such changes will occur with a slow chloride loss. —*Karel B. Absolon, M.D.*

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

The Problem of Infection in Burns by Resistant Micro-organisms with a Note on the Use of Bacitracin. John A. Moncrief and Jose A. Rivera. *Ann. Surg.*, 1958, 147: 295.

The authors report their experience with infection in burns from the Surgical Research Unit, Brooke Army Medical Center, Fort Sam Houston, Texas from 1950 through November 1956. During this time more than 1,000 patients with burns were treated and deaths from septicemia accounted for 55 per cent of all deaths. Among the organisms involved in these positive blood cultures were the hemolytic Staphylococci aureus which accounted for 45 per cent of the

pure cultures and 40 per cent of the mixed cultures. Pseudomonas and Proteus accounted for slightly more than 20 and 10 per cent respectively of both the pure and mixed cultures. The authors present tables which show that the number of deaths due to septicemia is increasing each year and they attribute this fact to the improved earlier care of these patients with fluid and electrolytes, thus allowing many more patients to survive the early period and enter into the later burn state. Of 63 proved cases of septicemia there were only 13 survivors. Of these 9 were in the pure Gram-positive group and 3 were in the Gram-positive and Gram-negative mixed group. There was only one survivor in a group of 19 patients with pure Gram-negative bacteremia. In comparing the septicemia survivors with the patients who died because of septicemia the average total burn area and the number of third degree burns were larger in the group dying. The survivors belonged to the younger age group. There is a definite positive relationship between the type of micro-organism growing on the burn wound and the type of micro-organism isolated from the lymph nodes and subsequently from the blood. Consequently, the burn area is thought to be the source of the contamination of the blood stream and every effort is made to convert the contaminated wound into a relatively clean wound with the use of grafts as early as possible. The source of contamination of the graft site, particularly Staphylococcus aureus, correlated well with the incidence of positive carriers among the personnel taking care of these wounds, both clean and contaminated. There was a higher incidence of carrier state among those doing dressings in the surgical wards than among those doing dressings under the sterile conditions of the operating room.

The resistance patterns of the organisms involved, particularly of the Staphylococcus aureus, have been similar to those of other institutions. In 1950 16.7 per cent of all staphylococci were resistant, whereas in 1955 96.3 per cent were resistant to penicillin. These mutational changes have been noted for the other antimicrobials including streptomycin, chlortetracycline, and oxytetracycline. This emergence of resistance has not been developed to bacitracin or chloramphenicol to a significant degree. The pseudomonas resistance pattern has been somewhat similar except for the different drugs involved. Polymyxin B retained 85 per cent susceptibility despite relatively prolonged use. Chloramphenicol susceptibility has decreased during this period of time and sensitivity studies against Proteus have shown that polymyxin has been of little value. Only chloramphenicol has consistently remained above the 50 per cent susceptibility level. Since the beta hemolytic streptococcus has always been a severe threat to grafts, all patients are maintained on penicillin as a prophylaxis against the group A streptococci. In treatment it has not been found satisfactory to treat the areas of the burns locally with antimicrobials. The other broad spectrum drugs are used only in the case of blood stream infection and under those circumstances 3 grams of chloramphenicol and 2 grams of erythromycin are given intravenously in divided doses 3 times daily and 300,000 units of bacitracin are given intramuscularly in divided doses 3 times daily. Since Staphylococcus aureus and Proteus account for more than 60 per cent of the micro-organisms isolated from the blood, this regimen is started prior to the actual isolation of the micro-organism in the laboratory. If the subsequent report indicates that Pseudomonas is present in pure culture the erythromycin and bacitracin may be discontinued and the patient is continued on chloramphenicol and polymyxin in dosages per kilogram up to 200 milligrams per day. The use of the drugs in septicemia is not based on the assumption that the clearing of the blood stream will accomplish a cure nor that this will be accomplished purely by the use of the antibiotics alone. Surgical treatment of the burn area is far more important and consists of removal of the eschar, converting the infected wound into a clean one, and subsequently grafting it. Surgical treatment is carried out as soon as possible, usually in a week or less.

Nephrotoxicity is difficult to evaluate because the patients with severe burns show albuminuria, casts, and elevated nonprotein nitrogen. Some depression of white blood count was noted in a few patients receiving chloramphenicol. From May to August, 1956 214 strains of Staphylococcus aureus were tested against novobiocin with 62 per cent being found susceptible. Since that time novobiocin has been used in conjunction with bacitracin, chloramphenicol, and erythromycin in the treatment of septicemia due to staphylococcus. The emergence of staphylococcal resistance to novobiocin occurred almost universally after about 2 weeks of treatment. Therefore, it was decided that the novobiocin had a limited application in burn therapy. This same pattern had been noted previously for erythromycin and chloramphenicol, but bacitracin is able to maintain an effective action against the staphylococcus for a period as long as 4 weeks. Even in patients with only minimal thermal injury who received bacitracin there were albuminuria, hematuria, and casts in the urine. These findings would be expected from the burn itself, but it was the clinical impression of the authors that persistent elevation of the nonprotein nitrogen was seen during the bacitracin treatment, and that all signs of nephrotoxicity disappeared promptly after the bacitracin was stopped and that no permanent impairment resulted. The article contains 23 tables giving the complete statistical analyses of the data presented and each individual case of septicemia is also tabulated. —*Peter Dineen, M.D.*

Experimental Basis of the Prophylaxis of Tetanus (Die experimentelle Basis der Tetanusprophylaxe). L. ECKMANN. *Helvet. chir. acta.*, 1957, 24: 297.

THE AUTHOR first points out that active immunization with tetanus toxoid is ideal prophylaxis for tetanus. Effectiveness even after a period of 10 years from the time of the original immunization has been proved beyond all question of a doubt in both animal experimentation and by observation of individuals immunized in the service during World War II. (The German experience during World War II was quite valuable. A large number of the German soldiers were not immunized with tetanus toxoid and, of course, large numbers were, so they had actually a controlled experiment among their military personnel.

Their observations on tetanus in civilians receiving injuries similar to those of the military personnel are also valuable.)

The author then elaborates on the drawbacks and dangers of the use of antitoxin, dwelling especially upon the dangers of repeated doses. Because of this, several observers on the continent used the simultaneous injection of tetanus toxoid and antitoxin or a preparation containing both serum and toxoid for the prophylaxis of tetanus in the acutely injured patient who had not previously had tetanus toxoid, their thought being that the antitoxin portion of the administration would give an immediate protection and the toxoid would begin the development of a permanent immunity. These workers, of course, admitted that there was a short period of time after the antitoxin had lost its effectiveness and before the toxoid had had an opportunity to bring about a permanent protection during which the patient would have a minimal protection.

A group of French authors used a technique of giving three doses of 1 c.c. each of tetanus toxoid, and one dose of antitoxin with the first injection. A year later, they showed that their patients had a good antitoxin titer and that this titer responded most rapidly by a rise when a booster dose was given.

After the publication of their work, however, the German Society of Surgery adopted a resolution condemning the simultaneous injection of toxoid and antitoxin as an acceptable method for the prophylaxis of tetanus. This is based upon the unproved contention that the presence of antitoxin in the patient would minimize the production of an active immunity by the toxoid.

Since 1951, the author has observed several hundred patients at the Surgical Clinic of the University of Basel. These were patients with acute injuries who were given the simultaneous injection of antitoxin and toxoid, and were observed 1 to 6 years later. He found that these people had an acceptable level of active immunity as shown by a titer of antitoxin in the serum and further found that the response to a booster dose in these individuals was as good as in people electively immunized with toxoid only. Following the presentation of his results on the Continent, in 1957 the German Society of Surgery rescinded their previous resolution and went on record as saying that the combined serotoxoid prophylaxis of tetanus was a preferred method. —*Robert C. Combs, M.D.*

Severe Tetanus; Steroid Narcosis (Erfahrungen mit der Steroidnarkose in der Behandlung eines schweren Tetanus). H. BIRKNER and H. W. OPDERBECKE. *Chirurg*, 1958, 29: 18.

A NEW DRUG, hydroxidion (Pfizer's "Viadril" or Schering's "Presuren"), was used in the symptomatic therapy of tetanus spasms. The primary difficulty encountered in using this drug is that it is very irritating to the blood vessels and tissues, probably because of its high *p*H. This difficulty was overcome by introducing a catheter intravenously and leading it directly into the vena cava where its administration did not lead to any complications. Dosage was guided by the clinical needs of the patient.

The drug was of value in stopping and preventing tetanic spasms. However, it did not exhibit any additional effectiveness when more than 8 gm. were given per day. In spite of the high total dose administered to the patient the values of various tests (serum bilirubin, Takata-Ara, Weltmann, and thymol turbidity) were normal.

There is no doubt that this drug contributed to a successful outcome in the authors' case. This does not exclude, however, the need for other well recognized medical and surgical procedures (early tracheotomy when indicated and excision).

—*Sidney Smedresman, M.D.*

Clinical Experience with Streptokinase Administered Buccally; Treatment of Infection and Edema. JOSEPH M. MILLER, GEORGE C. GODFREY, MILTON GINSBERG, and CONSTANTINE J. PAPASTRAT. *J. Am. M. Ass.*, 1958, 166: 478.

IN ORDER to obviate the disadvantages of intramuscular injections, a buccal preparation of streptokinase was tried. Tablets containing 10,000 units of streptokinase were prepared using streptokinase-streptodornase as the source of streptokinase. One tablet was placed in the buccal pouch twice a day for a minimum of 3 days.

This therapy was used in the active therapy of a variety of infections or edematous conditions in 62 patients with 55 excellent results. It was also used in 18 patients to prevent or minimize anticipated edema. The authors stress using this therapy only in conjunction with appropriate antibiotic therapy in infections, since the action of the streptokinase may permit organisms in a localized lesion to spread to the rest of the body.

Streptokinase is apparently efficiently absorbed from the buccal mucosa, and administration of the drug by this route may be expected to produce effects on the inflammatory reaction and the formation of edema comparable to those produced by the intramuscular route. —*E. Thomas Boles, Jr., M.D.*

ANESTHESIA

Performance of Ventilators; Effect of Changes in Lung-Thorax Compliance. JAMES O. ELAM, JAMES H. KERR, and CLINTON D. JANNEY. *Anesthesiology*, 1958, 19: 56.

IT IS GENERALLY CONCEDED that inhalation anesthesia is accompanied by a decrease in lung-thorax compliance. The mean value for anesthetized adults in one series is 0.062 liters per centimeter of water. To determine how closely various mechanical ventilators approach the ideal now attained in clinical anesthesia by experienced anesthesiologists by the feel of the gas bag, five different ventilators of the controllor type of machines were studied. The ventilator under study, a Heidbrink 9B circle, and a simulated lung-thorax system were utilized as test equipment. The compliance systems consisted of three rigid reservoirs. A Statham strain gauge was utilized to measure pressure changes in each of the three systems and a Statham pressure transducer indicated the volumes of air delivered into the rigid system. The Emerson controller-assistor, the Jefferson ventilator, the Morch surgical respirator, the Roswell Park respirator, and the Stephenson controlled respiration unit were tested.

All of these devices are time cycled, the cycling rate being prefixed by the operator and remaining relatively constant thereafter. The Emerson and Jefferson devices tend to attain pressures for which they are set and deliver volumes which vary primarily in response to changes in the system into which they operate. Both these machines, therefore, may be classified as "pressure limited, volume variable." The Morch and Stephenson machines possess diametrically opposite features. These ventilators tend to maintain the volume for which they are set and accordingly develop pressures which vary primarily under the influence of the system under which they operate. This group is best given the designation "volume limited, pressure variable."

For the pressure-limited volume-variable machines a meter should be available on the device to indicate changes in the volume delivered. In the volume-limited pressure-variable types a manometer in the system is essential for showing changes in the patient lung-thorax resistance and compliance. The study demonstrates the need for anesthesiologists to repeatedly readjust the controls of the Jefferson and Emerson devices to maintain alveolar ventilation within the patient's requirements. Without such readjustments the pressure-limited ventilator will inevitably produce either hypoventilation or hyperventilation in accord with the changes in chest compliance. These tests, on the contrary, favor the performance of the Stephenson and Morch devices in the face of such alterations in compliance. These volume-limited pressure-variable machines, despite compliance variations of a half to twofold, maintain their preset stroke volume within 10 to 20 per cent and reveal the compliance variations by a simple aneroid manometer.

—*Allan D. Callow, M.D.*

Amnesia-Analgesia for Management of Children Too Young to Cooperate: Method for Use During Cardiac Catheterization and Other Procedures. JOHN S. LUNDY. *J. Am. M. Ass.*, 1958, 166: 453.

A PROCEDURE for the management of cardiac catheterization in children too young to cooperate has been developed by the author.

The anesthesiologist obtains an estimate from the pediatrician of how great the risk of cardiac catheterization is on the basis of 1 to 4, 4 being the most marked risk. The method does not involve anesthesia but is a special application of analgesia and amnesia.

In brief, it involves a visit of the anesthesiologist with the child's parents so that what is about to be done can be explained to them. The child is weighed, usually in the morning, the mother having given the child an enema the night before. A table has been prepared which shows in compact form the details of the procedure.

Severe venospasm may occur if, during the procedure, the child is uncovered and is lying on a cold fluoroscopic table; therefore, a warm place is prepared for the child. Catheterization follows after which the anesthesiologist again receives the child into his care until he is ready either to send him to the hospital or to allow the parents to take the child elsewhere.

The method of management has been satisfactory, but variations of it have not been satisfactory.

An extensive and detailed preliminary outline, which may be hazardous if not followed exactly, is included in the complete paper.

Hypothermic Potentiation of Centrally Induced Cardiac Irregularities. DOMINICK P. PURPURA, J. LAWRENCE POOL, EDGAR M. HOUSEPIAN, MARTIN GIRADO, and Others. *Anesthesiology*, 1958, 19: 27.

BECAUSE OF the increasing application of hypothermic techniques in neurosurgical problems and because alterations in the cardiac rate and rhythm constitute one of the most serious complications encountered during hypothermia, examination of the mechanisms and control of cardiac irregularities of central origin were carried out in laboratory animals.

In this series, performed on more than 30 cats initially anesthetized with ether, information was obtained relating to the site of origin of certain cardiac reflexes, their hypothermic potentiation, and certain pharmacologic agents used in preventing or controlling these reflexes. The brain stem of the cats was exposed following suction ablation of the overlying cerebellum. Skin margins and pressure points were infiltrated with procaine and the animals were permitted to recover and then paralyzed with succinylcholine and artificially ventilated. Diencephalic and brain stem sites were stimulated electrically and these sites were later checked by gross or histologic examination. Electrocardiograms were recorded. Hypothermia was induced by packing the previously shaved animals in ice, and body temperatures were recorded with a rectal thermacouple. Pharmacologic agents were administered through an indwelling femoral catheter and consisted of chlorpromazine, sodium pentathol, dibenamine, atrophine, procaine, succinylcholine, and d-tubocurarine. The data indicate that the pseudoanesthetic action of moderately severe cold (23 to 26 degrees C.) on the central synaptic systems reflexly linked to vagosympathetic neurons is presumably readily reversed by changes in afferent bombardment such as occurs during the initial stages of the rewarming process. A similar reversal may be effected at these temperatures by increasing stimulus intensity; however, this event is likely to induce profound cardiac irregularities.

Succinylcholine is considered to provide a safe and powerful pharmacologic tool for preventing cardiac irregularities of the centrally induced type. Dibenamine is capable of transiently abolishing the cardiac effects of reticular stimulation through peripheral blockade of the sympathetic component, but it does not affect the electrocortical response to reticular stimulation. Similar effects are obtainable with atropine or vagotomy. Agents which exclusively depress central reticular interneurons are of primary importance in preventing various afferent drives from reflexly engaging vagosympathetic elements. Barbiturates in low doses are highly effective but also depress the general reticular activity. On the contrary, chlorpromazine (2 to 5 mgm./kg.) appears to block the induction of cardiac irregularities selectively by central sympathetic depression. Parenterally administered procaine exerts a relatively prolonged blocking action on centrally induced cardiac arrhythmias, although this agent affects both central and cardiac

synapses as well as the direct electrical excitability of the myocardium.

Of clinical significance is the fact that hypothermia increases the excitability of the cardiac reflex mechanisms in the unanesthetized paralyzed cat. These results may be attributed to a reduction in tonic inhibitory activity which some components of the brain stem reticular system exert on primary afferent and efferent pathways. This suggests that descending reticular effects of an inhibitory nature are as susceptible to cold blockage as ascending reticular influences. In view of this a number of prophylactic measures can be outlined which effectively eliminate cardiac irregularities produced by afferent stimuli arising from certain intracranial "trigger" sites and the potentiation of these stimuli by hypothermia. These measures must involve the use of adequate levels of anesthesia supplemented with central or peripheral cardiac synapse-blocking agents similar to those described. —*Allan D. Callow, M.D.*

Tolerance Limit in Interruption of Circulation Under Anesthesia and Controlled Hypothermia; Experimental Study on Animals (Ueber die Toleranzgrenze bei Kreislaufunterbrechung in potenzierter Narkose und in kontrollierter Hypothermie; eine tierexperimentelle Studie). G. HEINRICH. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1958, 286: 491.

AFTER A REVIEW of the literature concerning the problems of heart surgery, the author describes his own experiments on dogs. Nineteen animals were operated upon under pentothal anesthesia and artificial respiration after premedication with atosil-megaphen-dolantin. Thoracotomy, complete interruption of the circulation, and cardiotomy were performed. All of the animals survived an interruption of the circulation up to 5 minutes' duration for a long period of time. They showed no cerebral disturbances. If the interruption of the circulation was continued for more than 5 minutes the mortality increased, mainly because of hypoxia of the brain. If it increased to more than 10 minutes, survival was only temporary and death took place in a cerebral coma.

Interruption of the circulation under anesthesia plus controlled hypothermia was performed on 12 animals. All of the animals with interruption of the circulation for from 5 to 12.5 minutes survived for a long time without cerebral symptoms (one dog survived an 18 minute interruption quite well). The tolerance limit was thus considerably increased. Above this limit (12.5 minutes) the mortality increased, again mainly because of cerebral damage. Fibrillation was generally not observed even above the tolerance limit. Histologically, however, some damage to the heart muscle was detected as early as 5 minutes after the beginning of the interruption. The optimal temperature range was found to lie between 28 and 30 degrees C.

Numerous electrocardiograms and some microscopic pictures of the heart muscle illustrate the article. —*Victor R. Jablokow, M.D.*

Brachial Plexus Block; a Re-Evaluation and a Proposed Approach. P. C. LING and C. W. SHAFER. *Am. Surgeon*, 1958, 24: 38.

A MOST USEFUL, simple, and satisfactory method in the field of regional anesthesia is blocking of the brachial plexus. The supraclavicular technique is the most widely employed.

The authors review the subject of brachial block and describe the conventional supraclavicular method, enumerating the advantages and disadvantages of this procedure. By anatomic dissection and clinical application, they present a modified technique for brachial block which differs from the usual supraclavicular method. The block needle is inserted 1 cm. above and 1 cm. medial to the midclavicular point, directed downward, backward, and outward instead of inward. By this modified technique of anatomic dissection with methylene blue injections, it was found that the dye was deposited more accurately around the trunks of the brachial plexus over the first rib.

With the clinical use of this modified technique in 137 patients there were only 2 failures and no case of proved pneumothorax. —*Mary Karp, M.D.*

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Use of Air as a Contrast Medium in the Diagnosis of Intestinal Obstruction of the Newborn. JOHN W. HOPE and A. EDWARD O'HARA. *Radiology*, 1958, 70: 349.

IN THE NEWBORN INFANT with a possible obstruction a diagnosis should be made immediately and with a minimum exposure to radiation. Fluoroscopy with an opaque contrast medium seldom achieves a diagnosis, while simultaneously exposing the infant to a large amount of radiation. Air is the best contrast medium for the diagnosis of a complete obstruction, and when used in conjunction with a few "plain" films involves relatively little radiation exposure.

—*John J. Maloney, M.D.*

Rotating Anode Tube with Very Small Focal Spot; Direct Enlargement Radiographic Study. SHINJI TAKAHASHI, TSUKASA WATANABE, and KOICHIRO SHIGA. *Nagoya J. M. Sc.*, 1958, 20: 231.

THE DETAILS of construction of a rotating anode tube with a very fine focus of .3 mm. which has recently become available in Japan are described. This tube has two focal spots, the effective size of which are 2.0 mm. and 0.3 mm. It is possible to make the 0.3 mm. focal spot variable by the bias phenomenon which is described as the bending of an x-ray beam to become more convergent if it passes through an electric field in which the power line is directed toward the electron beam.

With a trial tube constructed as described, roentgenograms were taken of several parts of the living adult human body and compared with conventional films of the same part. These magnified roentgenograms revealed a sharp and cleaner image of trabeculae than conventional ones.

This conclusion was most specifically based on the number of trabecular networks which could be counted in a given area on the two types of roentgenograms. For instance, on a conventional film of the os cuboideum 20 networks were counted in a 0.5 cm. area, whereas on a 7 times magnified film, 76 networks could be counted. Fine intensifying screens are not essential for magnification roentgenography, as has been previously thought.

Use of the tube more than 3,500 times did not cause destruction of the target surface. These studies were made with medium speed intensifying screens.

—*Lois Cowan Collins, M.D.*

A Study of Hodgkin's Disease Treated by Irradiation. M. VERA PETERS and K. C. H. MIDDLEMISS. *Am. J. Roentg.*, 1958, 79: 114.

THIS REPORT includes 138 cases previously traced and described in 1950 in a report from the department of radiotherapy of the Toronto General Hospital. These and additional cases added for this report have all been verified as true Hodgkin's disease by the pathologist at Toronto General Hospital. For the sake of completeness, however, 7 cases of mediastinal Hodgkin's disease without histologic verification have been included.

The authors stress the value of early diagnosis, energetic initial treatment, and close follow-up on those patients who are diagnosed as suffering from Hodgkin's disease.

One-half of the patients first noted the disease in cervical lymph glands and only 9 per cent demonstrated initial involvement of more rare sites.

In studying the gross survival rate, it is found that of the 291 patients studied, 194 survived one year, which represents a loss of 34 per cent during the first 12 months. On the other hand, the 15 year survival rate of 25 per cent is significant and the 20 year survival rate is encouraging. It is found that if a patient survives for 10 years without recurrence, there is little risk of recurrence during the next 20 years. Also, it is noted that the percentage loss during the first year is very nearly the same as the percentage loss (37 per cent) for the next 9 years.

As might be expected, it was found that the prognosis for those patients with multiple sites of involvement at the first examination is much worse than for those with a single site involved. The difference in survival is more than 50 per cent up to 15 years. The absence of constitutional symptoms is almost as important as staging in assessing the disease.

The best survivals are found in the younger age group with the 6 survivals of the first decade being free of the disease since initial control. Sex is not as important a factor as age although the female sex seems to have a better prognosis despite the fact that the disease occurs 2 to 1 in males as compared to females.

It is believed that the stage of the disease (single or multiple sites) and the duration of symptoms provide the best indications for the chronicity or acuteness of the disease. It is further thought that in a rapidly progressing disease, complete segmental radiation might be of greatest benefit while in a slower progressing or chronic disease, greatest benefit might be obtained with local radiation.

A comparison of the cases in the various stages leads to a conclusion that prophylactic radiation or radiation beyond the extent of the disease increases the survival rate by as much as 20 per cent.

An incidental note is made of the fact that those patients who were pregnant at the time of diagnosis of the disease responded to initial treatment somewhat better than expected. Pregnancies subsequent to initial treatment have not seemed to alter the disease.

The course of treatment for stages 1 and 2 Hodgkin's disease entailed administration of a tumor dose of 2,500 to 3,000 roentgens in 2 weeks to each area of involvement, as well as a tumor dose of approximately 1,000 roentgens to each of the proximal lymph node regions. If indicated, segmental irradiation of all of the chief lymphatic chains is advised to supplement the radical treatment of the involved areas.

The authors believe that the chemotherapy applied allowed a greater number of patients to survive one year and in selected cases caused a number of remissions of short duration during the course of the disease.

Associated conditions were found in a number of patients. Other malignant conditions were found in 11 of the 291 studied. Diabetes was found in 6, tuberculosis in 6, poliomyelitis in 4, myxedema (postirradiation) in 3, and herpes zoster in 14. In 12 of the patients, the attack of herpes zoster ushered in a series of recurrences which resulted in terminal disease.

—*John J. Bergan, M.D.*

MISCELLANEOUS

Clinical Considerations with Reference to the Origin and Treatment of the Irradiation Leucopenias (Klinische Betrachtungen ueber Entstehung und Behandlung der Bestrahlungsleukopenie). D. SCHOEN. *Fortsch. Roentgenstrahl.*, 1958, 88: 12.

THE WHITE BLOOD PICTURE in 461 patients, treated with deep roentgen therapy forms the basis for this report. Conventional deep roentgen therapy (200 to 220 kv), ultra-hard roentgen rays (15.8 mev = megavolt), and accelerated electrons in the energy band from 5 to 15 mev. were used in this material. The white blood counts were begun on the fifth or sixth day from the time of application of the first treatment. A white blood count of less than 3,000 was considered as indicating the presence of a leucopenia. In a few instances sternal puncture was added to the study methods.

Of these 461 patients, 135 (29 per cent) developed leucopenia. The relationship to the body region showed that irradiation had been given over the abdomen in 66 cases (44 per cent), over the thorax in 64 (28 per cent), and over the head and neck in 5 (8 per cent). There were no instances of irradiation leucopenia following irradiation therapy of the extremities.

The author was able to demonstrate the influence of the chronologic spacing of the doses; even one day of rest showed a recuperative effect in relation to the leucopenic manifestations. The leucopenic reaction showed a tendency to develop earlier when previous irradiation had been administered.

Two of the patients, a man who had been irradiated for rectal carcinoma and a woman who had received roentgen therapy for mammary cancer, showed, 5 years after the last series of irradiations, leucopenias of 2,400 and 2,550 leucocytes per cubic centimeter, respectively, but with a normal red count and a normal differential white count. Both of these patients were able to work and there was no evidence in either of metastasis or of a tendency to develop infection. In other instances the leucopenia lasted as long as 6 or 7 months; however, the average period was 4 to 8 weeks. In the instances in which evidence of recuperation did not appear during the free interval between treatments subsequent irradiations showed a more depressant effect than in those with such recuperation.

The organ-selective factor in the production of this leucopenic reaction was shown in this material by the irradiation applications to cancer of the breast. The right mammary cancer-irradiation (concomitant irradiation of the liver) showed a leucopenic proportion of 30 per cent, while that for the left breast (concomitant irradiation of the spleen) was 40 per cent. The criterion of the volume of tissue irradiation for the development of leucopenia was shown by the type of irradiation therapy applied. The ultrahard rays, for which the volume dosage is far less than for conventional irradiation, produced markedly more rapid recuperation. Of the patients (40) receiving 3,000 to 6,000 roentgens of the ultrahard rays, only 20 per cent developed leucopenia; 3 of this 20 per cent had irradiation of the abdominal region.

The differential white counts were confusing and at times contradictory; however, as a rule, the lymphocytes were the hardest hit. There was no evidence in this material of decrease in the erythrocyte count or in the hemoglobin titer. This failure of the red and white counts to show any parallelism is considered by the author to substantiate the theory that the causal agent of these leucopenias is not one of direct mechanical injury by the ionizing rays to the bone marrow. The author believes that the pathogenesis of irradiation leucopenia lies in the field of autoaggression, that is, that the reaction arises from the toxic inhibition of white blood production, the toxin or toxins arising from the breaking down of the patient's own leucocytes. He believes that this is partially substantiated by the ameliorative effects of the administration of ACTH.

In illustration of this ACTH effect, there is appended the case history of a woman who developed lymphogranulomatous glandular tumors in the neck and in the mediastinum after pregnancy, for which she received a number of irradiation treatments. During the last series her leucocytes dropped to 1,700 and the therapy had to be stopped. Following the injection of ACTH (40 mgm. per day for 5 days) a reticulocytic crisis and a continuing rise in all the blood cell elements occurred. The irradiation therapy could now be resumed, the blood cell values rising even during the treatment period. This result led the author to ascribe to ACTH a certain causal-therapeutic relationship to irradiation leucopenia.

—*John W. Brennan, M.D.*

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Blood Lipoids, Blood Sugar, and Tumors (Blutlipoide, Blutzucker und Tumoren). E. LEUPOLD. *Chirurg*, 1958, 29: 7.

THE THERAPY advocated for tumors rests on the principle that parenteral absorption of metabolic products in minutest amounts induces profound changes in blood chemistry as shown by the analysis of cholesterin, lipoid phosphorus, and blood sugar. The sugar to phosphorus and the cholesterin to sugar to phosphorus ratios are of great significance. It has been shown experimentally in the rabbit that a drop in the cholesterol to sugar to phosphorus quotient following intracutaneous administration of metabolic products results in tumor formation. Conversely, an increase in the quotient results in tumor destruction. The rate of change of cholesterin and sugar is of utmost importance. Therapeutic results are obtained following an increase in the blood sugar. Accordingly, a 40 per cent solution of 10 to 30 gm. of sugar is given intravenously. To produce the desired rapid change of sugar concentration insulin is given. A lipoid mixture is injected subcutaneously (producing a wheal) directly following the administration of sugar. By varying the amounts of sugar and insulin administered it was possible to produce changes in the ratios of the various systems up to 1,000 per cent.

The percentage change in the cholesterin to sugar to phosphorus system before and after therapy is of prognostic significance. If the final values are lower than the values at the beginning of therapy the prognosis is favorable. New growth occurs if the final values are 100 per cent or more than the basic values obtained before treatment is instituted.

Since sugar is the most labile component of the various systems, a change in sugar values can be of utmost significance. Therefore, sugar in any form is to be avoided by the patient. Operations and biopsy procedures are to be shunned since they tend to produce an unfavorable metabolic ratio for the patient.

There is wide variation in the response of various tumors. Thus, some disappear with astonishing rapidity while others require months of treatment. A complete failure to respond was noted in only one 16 year old boy with a chondro-osteosarcoma. The oldest patient, with a cancer of the vulva, has not had a recurrence for 14 years. —*Sidney Smedresman, M.D.*

Ascorbic Acid Economy in Surgical Patients as Indicated by Blood Ascorbic Acid Levels. JOHN H. CRANDON, BERNARD LANDAU, STANLEY MIKAL, JAMES BALMANNO, and Others. *N. England J. M.*, 1958, 258: 105.

THIS STUDY concerns the requirements of ascorbic acid, the effects of its deficiency, and the significance of blood acid levels in adult surgical patients exclusive of those suffering burns or severe trauma. On the basis of a clinical appraisal of surgical patients, a plasma level of below 0.2 mgm. per 100 ml. with a buffy-coat ascorbic acid below 8 mgm. per 100 gm. was considered evidence of a serious deficiency of this vitamin. All analyses were performed immediately by the Roe-Kuether method with Butler-Cushman tubes to separate the buffy coat by centrifugation. Investigation of the hospital records of the patients suffering wound dehiscence in this study indicates that among those showing low blood ascorbic acid levels the administration of supplementary ascorbic acid postoperatively had been overlooked in all but 3 patients.

The finding of tyrosyluria among patients deficient in ascorbic acid after a 30 gm. test dose of L-tyrosine is reported. The deficient patients with the greatest inflammatory processes show the greatest increase in tyrosyl excretion after test dosing.

Surgical patients with severe inflammatory processes were observed to require 300 mgm. of ascorbic acid daily. As judged by the tyrosine excretion test, the patient sufficient in ascorbic acid who has been subjected to major surgery does not act biochemically like the scorbutic patient.

—*W. Foster Montgomery, M.D.*

DUCTLESS GLANDS

Thyroidectomy; 1,000 Cases. ALAN PRYDE. *Med. J. Australia*, 1958, 1: 66.

IN 1,000 CONSECUTIVE thyroidectomies the author encountered various difficulties and committed several errors. He discusses those complications in this article.

To avoid an unsightly scar he takes care to mark the incision before the day of the operation, closes the pretracheal muscles and the skin, but not the subcutis, and always uses a drain. Aspiration is performed before injecting local anesthesia because the author has had ill experiences with direct intravascular injection. He avoids injury to the trachea by using scissors to separate the gland from the trachea instead of a knife. He makes no effort to expose the recurrent laryngeal nerves, because late perineural scarring has caused paralysis. However, he is careful to avoid injuring any nervelike structure, including branches of the cervical sympathetics which supply the dilators to the pupil. Laryngospasm usually subsides without special treatment, but it may be serious enough to require tracheotomy. This complication is rare, and, except occasionally, does not cause the author to use endotracheal anesthesia. Pneumothorax twice followed injection of the lower pole regions with local anesthetics and the maneuver is no longer used. Transient postoperative tetany complicated 14 convalescences. Postoperative bleeding which was not adequately drained necessitated opening the incision in 10 cases. Strips of gauze were placed as packs, and were brought out through small gaps in the skin incision between clips. The cosmetic defects were minor; the wounds healed quite nicely after the packing was removed (48 hours). In 2 patients the pressure of hemorrhage on the trachea was relieved only by tracheotomy. Two wounds

became infected. When the pyramidal lobes were not removed, or when nodules were left in the remnants of the lateral lobes, unsightly enlargements appeared. In some cases reoperation was necessary.

Although modern methods of treatment reduced the risk of thyroid crisis, one of 6 patients with that complication died. There were 6 other fatalities: one with hemorrhage, one with heart failure, one with cerebral embolism, one with laryngospasm, one with pneumothorax, and one with arrest of the heart shortly after the operation began. —*Leonard D. Rosenman, M.D.*

The Relationship of Estrogen Metabolism to Fibrocystic Disease of the Breast. WILLIAM C. LAFORGE and FRANCIS H. STRAUS. *West. J. Surg.*, 1958, 66: 24.

MONTHLY CYCLIC CHANGES in the breast parenchyma are the result of cyclic changes in the balance between the circulating estrogens and progesterone. If a relative or absolute excess of estrogens is present, the changes of fibrocystic disease of the breast occur. The estrogen level is regulated at least in part by inactivation of estrogens in the liver, a process which is apparently related to the presence of thiamine and riboflavin in the diet. This relationship of estrogen level to diet has been observed experimentally and clinically.

To determine the effect of thiamine and riboflavin on fibrocystic disease in the breast, 34 patients with this disorder were treated with high doses of these vitamins for an average period of 5.5 months. Complete freedom from this disease was attained in 32 per cent of patients, definite improvement in 56 per cent, and no demonstrable change in 12 per cent. In all patients who were helped by this treatment, continuous medication was necessary to avoid the return of symptoms.

It is emphasized that surgical excision is the only acceptable treatment for a breast lesion that persists through the onset of menses, the conservative treatment described above being indicated only after a positive diagnosis of benign disease has been made.

—*Stanley W. Tuell, M.D.*

EXPERIMENTAL SURGERY

A Case of Hypothermia to 23.5 Degrees Centigrade Followed by Recovery (Un cas de réfrigération à 23°5 suivi de guérison). L. JUSTIN-BESANÇON, H. PÉQUIGNOT, and J. P. ETIENNE. *Sem. hóp. Paris*, 1958, 34: 63.

THIS is a complete case report of a patient who was admitted to the hospital with a body temperature of 23.5 degrees C. His recovery was complicated by pneumonia with pleurisy and delirium tremens. Of considerable interest is the careful observation of electrolytes and other studies during the period of recovery. Those interested in hypothermia should read the original article because of the details given in tables and figures. —*Roger H. L. Wilson, M.D.*